Canada's Changing International Trade Landscape – Opportunities, Threats and Forgone Opportunities for the Beef Industry

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ABSTRACT

The Canadian beef industry is an important contributor to Canada's agricultural sector and beef exports represent a significant proportion of production. Canada was engaged with eleven other Pacific Rim countries negotiating the Trans Pacific Partnership. A number of these countries are major producers and exporters of beef, or major potential markets for beef. The Trans Pacific Partnership (TPP) could potentially lead to a major re-alignment of beef trade across the Pacific. Under NAFTA, Canada and Mexico currently have tariff-free access to the United States market, however, under the TPP that preferred access would extend to include all member countries, including large global competitors. Canada's international trade landscape under which the Canadian beef industry must operate may change in important ways in the near future. The Trans Pacific Partnership agreement provided additional opportunities for the beef industry, which may now be forgone in the wake of the US presidential election of 2016. During the US election, there were explicit references to either re-negotiating NAFTA or "tearing it up". This thesis provides an analysis of the various possible effects on Canadian beef trade based on a variety of trade agreement outcome scenarios by adapting the partial equilibrium Global Simulation Analysis (GSIM) model for the analysis. This single product, multi-region model provided trade and welfare results that can be compared between various scenarios. The scenarios in this thesis depend upon the future of NAFTA and the potential evolution of the TPP and provide a comparison of multiple possible outcomes. Ultimately, the TPP is good for Canada's beef exports and the loss of the U.S. preferential treatment under NAFTA has the largest potential for a negative impact on Canada's beef industry.

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I would like to dedicate this work to my family and friends who provide happiness and support in my life and whom inspire me to strive for excellence and to be kind to everyone. I would also like to thank the entire department for all their support, social activities, and discussions.

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Chapter 1: Introduction

1.1 Background

Beef is a widely consumed meat product and is generally considered a normal good, the consumption of which will increase as income rises. The consumption of beef globally has been relatively constant over time, decreasing and increasing in various countries (OECD, 2015). Within Canada, consumption has declined slightly, from 21.516 kg/capita in 2008 to 18.025 kg/capita in 2014 (OECD, 2015). In 2009, beef production in Canada "contributed $23 billion to Canada's economy," and is an important part of both the national economy and some provincial economies (Canadian Beef, 2015, pg.1). Canada's beef production increased 5.4% from 2010-2011 and contributed CAN$33.75 billion to Canada's economy. In 2012 Canada exported 42% of the total beef and cattle produced (Canada Beef, 2012). In 2012 nearly three quarters – 73.5% – of Canada's beef exports in 2011 were destined for the United States (Canadian Beef, 2012). For the purposes of this thesis, the 6-digit HS code 02013 (meat of bovine animals, fresh or chilled, boneless) will be used. This tariff line accounts for approximately 87.6% of Canada's exports of meat of bovine animals, fresh or chilled (HS code 0201) and approximately 33.7% of all exports of meat and edible offal (HS code 02) including wine and poultry, to the United States, as per the UNCTAD's TRAINS database. The beef described in this HS tariff line is commonly referred to as 'chilled boxed beef.

The Trans Pacific Partnership Agreement, or TPP, is a 12-member multilateral free trade agreement. Negotiations began in 2004 with four members and grew to include more

countries. The deal was signed by the 12 member countries on February 4th, 2016. New Zealand, Singapore, Chile, and Brunei are the four founding members of the Trans Pacific Partnership. The negotiations eventually grew to include the United States, Japan, Brunei Darussalam, Australia, New Zealand, Chile, Malaysia, Peru, Singapore, Vietnam and Mexico, as well as Canada.

1.2 Research Problem

The North American Free Trade Agreement (NAFTA) has had a significant impact on North American beef trade since it came into effect in 1994. Within the NAFTA agreement, two TPP member countries, Canada and Mexico, gained tariff-free access to the US beef market. The US is one of the countries, along with Canada, which engaged in the TPP negotiations. With tariff-free access through NAFTA, Canada (and Mexico) have better access to the US beef market than other important beef exporting countries included in the TPP agreement. Within the new TPP agreement, similar preferential access is to be extended to include all TPP member countries. This result has considerable potential to alter the global beef trade environment, primarily due to the inclusion of Australia and New Zealand as part of the TPP. Australia and New Zealand are competitive global beef exporters, with Australia currently being the largest source for beef imported into the US, with Canada following in second place (USDA Economic Research Service, 2016). This is the case before Australia would receive improved access under the TPP.

If the US beef tariffs are eliminated for TPP countries, Canada's beef exports to the US may be negatively impacted. However, there are other factors within the TPP that may help to

mitigate the risk of losing some of Canada's market share in the US, that being the opening of Japan's agricultural markets. Due to the reforms instituted by Prime Minister Abe Shinzo, the powers of the Central Union of Agricultural Cooperatives (Japan's largest farm lobbying group) or JA Zenchu as it is commonly known, have been curtailed. In line with TPP commitments, and in the wake of the reforms, Japan's beef market and border measures could face a major restructuring that could create a major opportunity as a beef export destination.

The realignment of the Pacific Rim beef trade will affect many aspects of the global trade environment. Using the partial equilibrium Global Simulation Model (GSIM), it is possible to estimate the changes in trade quantities, prices and in surpluses from the potential changes brought by trade agreements such as the TPP. Australia produces 3.9% of beef globally but over 60% of their production is exported, making them consistently one of the top three largest global beef exporters, Brazil and the United States are the other two largest exporters (PricewaterhouseCoopers, 2011). Australia and New Zealand are globally competitive nations with a major interest in the negotiation of the liberalization of the beef markets in the TPP.

The U.S. election in 2016 created uncertainty for the future of trade agreements such as the Trans Pacific Partnership, which has yet to be ratified by the U.S. and of NAFTA, which has been in place for a number of years. The new President of the United States, Donald Trump, who is vocal regarding trade and the future of these agreements, is also

unpredictable. He has promised to renegotiate NAFTA; however, no actions have yet been taken and it is difficult to determine the eventual outcomes.

1.3 Organization of the Study

This study will be organized in the following manner. Following this chapter, Chapter 2 will provide an in-depth background on the current situation of the beef trade within the Pacific Rim (TPP members in particular). Canada, the US, Mexico, Australia, New Zealand and Japan are the major players in the potential TPP beef market based on the size of each nation's beef industry and their global importance, but all TPP members will be included in the analysis. Further, given the global connectivity in the markets for beef, other major suppliers such as Brazil, Argentina, and Uruguay should be included in the analysis as well as the Rest of the World (ROW). The third chapter depicts the history, negotiations, and what was agreed in the TPP agreement. Chapter 4 provides an in-depth description of the model to be used, the Global-Simulation Model. Chapter 5 and 6 deals with the sources for the data and then the latter chapter will describe the various research scenarios to be investigated. Chapter 6 will describe the results of the model. Chapter 7 provides a discussion and the conclusion based on the results of the research and this thesis topic overall.

Chapter 2: Overview of Pacific Rim Beef Trade

2.1 Background on Pacific Rim beef trade

The trade in beef across the Pacific Rim shows considerable diversity when all the members of the TPP are considered. The TPP agreement encompasses countries that are some of the world's largest exporters and importers of beef. Each TPP country has a few sensitive industries that could be considerably impacted by the trade agreement. This is seen in the larger economies where negotiations became increasingly difficult once the majority of issues were agreed. Whether it was the automobile industry for the US and Japan, dairy for Canada or intellectual property for Australia, each country had difficult issues to deal with in reaching an agreement.

When it comes to beef, except for New Zealand, the major players did not enter the TPP negotiations when they began, they all joined later. The TPP negotiations are relatively unique because new members have been added over time (Kerr, 2013). The major countries that are important players in international trade in beef that are also TPP members are the United States, Australia, Mexico, Canada, and Japan, along with New Zealand. These countries, and all the TPP members, of course, also trade with non-TPP countries. The major beef producing countries that trade heavily in the Pacific Rim are Brazil, Uruguay and Argentina.[1] The relationship between the main beef exporters/importers and the other TPP members, Brazil, Argentina, and Uruguay, as well

[1] In the formal modelling for this thesis, other beef trading countries will be aggregated as Non-TPP.

as the Rest of the World (ROW), will be the focus of this thesis. Global beef production is a large industry, with a strong export market component.

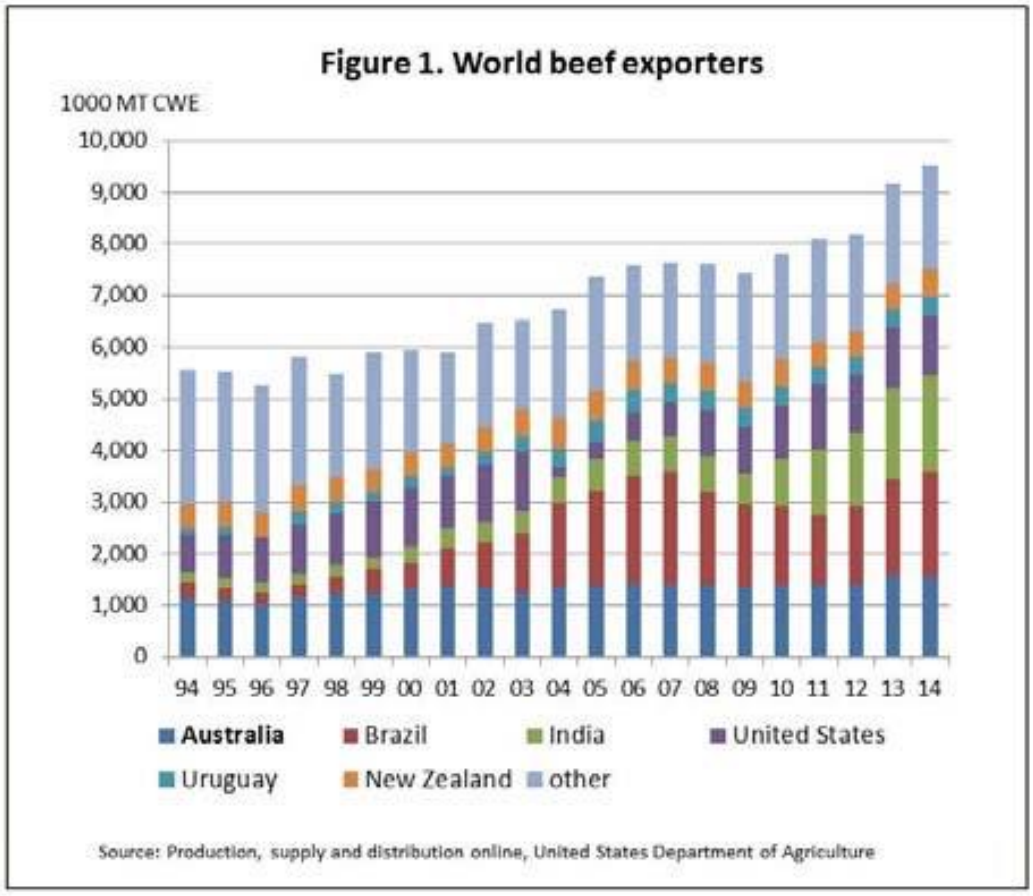

Figure 1. World Beef Exporters

Image Source: Kondo, 2014, Figure 1, Page 1

2.2 Country Overviews

2.2.1 Canada

Canada was ranked eleventh in global beef production in 2015, producing 1.74% of the world's beef (Cook, 2015). In 2012, Canada ranked slightly higher at number 10 and

produced 2.1% of world beef supply, which amounted to approximately 57 million metric tonnes (Canadian Beef, 2012). Within Canada, during 2011, 45% of the total beef and cattle produced were exported, which equaled to 336 million kgs (Canadian Beef, 2012). While exports of beef and cattle in 2011 were 336 million kg, imports were 206 million kg, with the US being the destination for 75.2% of those exports and the source of 73.4% of those imports (Canadian Beef, 2012). Mexico and Japan also received 10.8% and 3.5% of Canadian exports respectively in 2011, while the rest of Canada's imported beef came from New Zealand (12.6%), Uruguay (6.3%), Australia (4.8%), Brazil (3.7%) and Argentina (0.5%). Under NAFTA, Canada holds preferential tariff-free access to the US market. Japan's beef imports are currently restricted by large tariffs, although the country is a large beef importer and could present a significant market opportunity if the borders were to open. Under the TPP, these tariffs will drop to 9% from 35%, potentially creating a larger import market for foreign beef.

Canada has a unique beef landscape in that there is a large difference in the import/export quantities across the country. Canada is a large country with relatively distinct geographic regions. Western Canada, which includes all provinces and territories to the west of the Ontario-Manitoba border, is a major beef producing and exporting area. In contrast, Central and Eastern Canada, which includes all provinces to the east of the Ontario-Manitoba boundary, tend to be on a net import basis. In short, beef exports flow out of Western Canada into the Western and westerly Midwestern states in the US and imports flow into Central and Eastern Canada from the Easterly Midwestern states. This disparity in trade quantities means that Canada can be split into two separate geographic regions in

the analysis. This will create a better understanding of possible impacts on Canada both as a whole and for both segments of the country. Figure 2 below displays the percentages of beef cow herds in each province. We can see that Central and Eastern Canada, mainly Ontario and Quebec, only represent approximately 13% of Canada's herd. Western Canada contains the majority of the herd at approximately 86%. There is also a live cattle export market dynamic that exists between Canada and the United States. Canada was also the sixth largest exporter of beef in 2012, exporting 5.2% of world beef exports with approximately 8.7 million metric tonnes (Canadian Beef, 2012).

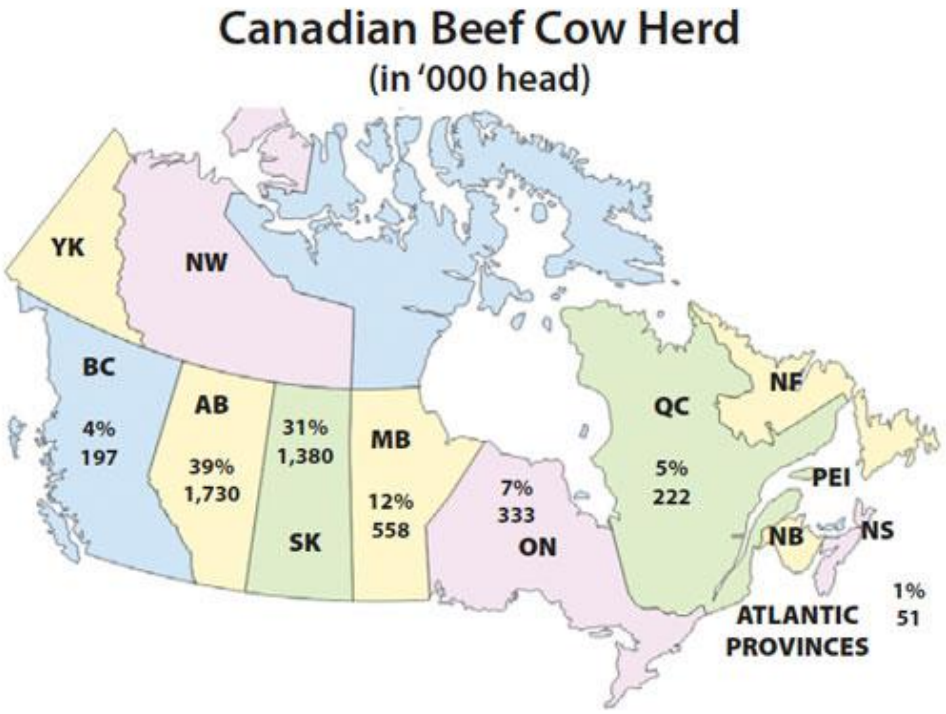

Figure 2. Map of Canadian Beef Cow Herd

Image Source: Canadian Beef, 2015

2.2.2 Australia

Australia is a very large beef exporter and is Japan's largest source of imports. In the 2011-2012 trade year, Australia exported 325.8 kiloton (kt) of beef to Japan, compared to 205.2 kt to the United States and 12.1 kt to Canada (Australian Bureau of Agricultural and Resource Economics and Sciences, 2013). In 2015, Australia was the world's 7th largest beef producer, with 4.36% of global production (Cook, 2015). Australia is also a large exporter of beef to the US, which is also Canada's main destination for beef. Currently the U.S. has a TRQ (Tariff Rate Quota) system in which Australia has a quota for US market access and may ship up to 418,214 metric tonnes of beef at a within quota tariff rate of zero. The World Trade Organization (WTO) TRQ is equal to 343,110 metric tonnes which is augmented by an additional 36,287 metric tonnes of duty-free quota available under the Australia-US Free Trade Agreement (AUFSTA) of May 2014 (Rodrigo, 2015). The quota amount is slated to increase to 438,214 metric tonnes by 2021 (Australian Meat and Livestock Industry, Order 2014). Australian exporters must pay an increased tariff if they reach 85% of the quota by October 1 of any year, which triggers a quota allocation system, and means any beef shipped after that quota is filled will be subject to a higher tariff rate, which could "be as high as 20% for high quality beef cuts, and 31.1% for veal (Rodrigo, 2015). Australia filled their quota allowance in 2015, triggering the duty. The USDA ERS WTO trade graph shows that 100% was filled for the year 2015.

Figure 3 below displays the steady export of Australian beef to its main customers, Japan and the US.

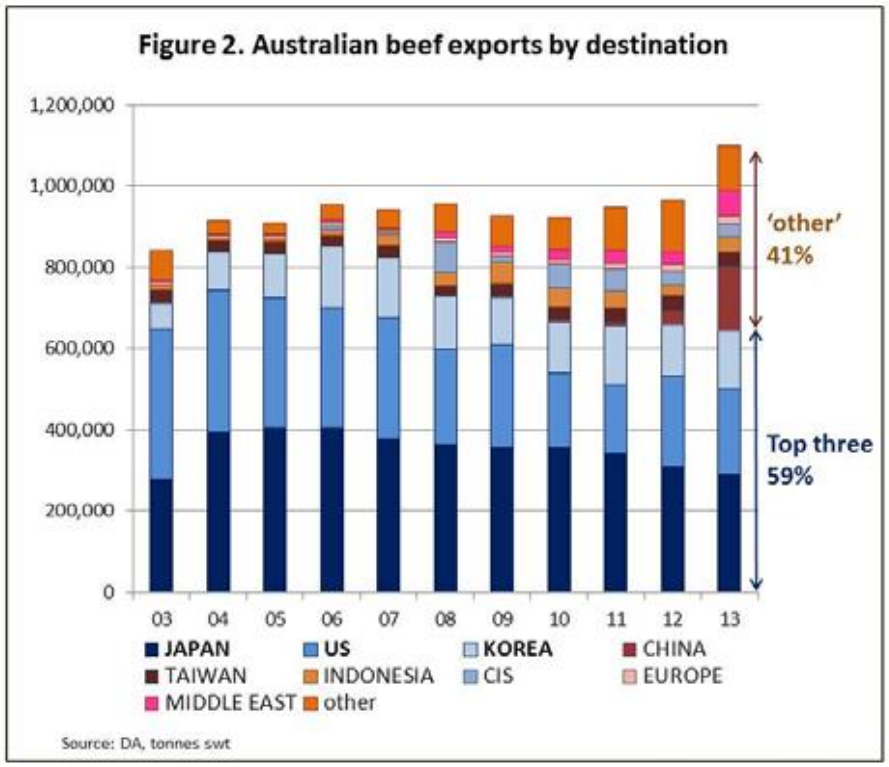

Figure 3. Australian beef exports by destination

Source: Kondo, 2014 Figure 2, Page 2

2.2.3 New Zealand

Despite its relatively small size New Zealand produces a large amount of beef, although not nearly as much their nearby neighbour Australia. New Zealand produced 569,699 tonnes cwt of beef in 2012 and exported approximately 80-95% of production, this can be compared to 2,152,031 tonnes cwt produced in Australia in the same year (Meat and Livestock Australia, 2015b). New Zealand is the second largest source of beef imports into the United States., exporting roughly half of the amount that Australia (the largest) exports to the U.S. and is similar in size to Canada's beef exports to the U.S. (Cook, 2016). The U.S. and North America is the destination of the majority of New Zealand's beef exports with approximately 175,000 tonnes destined for North America in 2012, compared to

approximately 85,000 tonnes destined for North Asia (Beef + Lamb New Zealand, 2015). New Zealand faces a TRQ quota restriction on its beef exports to the U.S. at an amount of 213,402 metric tonnes, with an above-quota tariff rate of 26.4% (USDA ERS, 2016).

New Zealand maintains a large herd, between 3 and 4 million head but that number has been on the decline over the past decade (Beef + Lamb New Zealand, 2015). Both New Zealand and Australia maintain very high safety standards in their beef industries, with strong phytosanitary procedures and measures in place. Meat and edible offal are New Zealand's third most valuable export commodity and their four most important exports market countries for all goods and services exported from New Zealand are, from first to fourth, Australia, China, United States, and Japan (New Zealand Trade and Enterprise, 2015).

2.2.4 United States

The United States is important to the Trans-Pacific beef market due to their position as both a large exporter and importer. The United States is also the world's largest producer of beef, producing nearly 19% of global beef supply, equal to 10,861,000 metric tonnes (Cook, 2015). 1,196,752 metric tonnes of the United States 2014 production was exported, with the main destinations for the exports being Mexico and Japan which receive approximately 240,000 metric tonnes, as well as Hong Kong/China, Canada, the Middle East and South Korea in the range of 110,000-150,000 metric tonnes (USMEF, 2014). In 2015, the U.S. sourced the majority of its beef imports from Australia, followed by New

Zealand and Canada. These imports increased from 2014 to 2015 by 25%, 15% and 5% respectively (Cook, 2016).

With regard to Mexico and Canada, it is important to note the current beef trade situation. Under the North American Free Trade Agreement (NAFTA), both Canada and Mexico have garnered tariff-free access to the US beef market. This treatment is considered preferential, as Australia and New Zealand operates under a TRQ system. Australian beef is still subject to high tariffs should they exceed their quota allotment. It is easier to trade beef amongst Canada, the US, and Mexico because there are no tariff barriers to worry about. The only major concerns are related to phytosanitary issues or country of origin labelling.

2.2.5 Mexico

Mexico is strategically located directly south of the United States, meaning their beef industry is considerably dependent and integrated with the U.S. market. Globally, Mexico ranks 8th in world beef production, producing 3.16% of the world's beef (Cook, 2015). They are the fourth largest source of beef imports to the US, following Australia, New Zealand and Canada, respectively (Cook, 2016). Mexico is a large exporter of live cattle to the US, where cattle can be fed at a lower cost. Mexico imports a large amount of beef from the US, importing the "largest quantities of U.S. beef and beef products of all U.S. beef trading partners," (Peel et al, 2011. Pg.1). Between 1994 and 2013, the USDA estimates that Mexican beef production had fallen by two percent and that consumption fell by nine percent, most likely due to the high price of beef, causing consumers to turn less expensive protein substitutes (Borror, 2014). Both Mexico and Canada have been subject to

preferential access to the U.S. market under NAFTA, although these conditions will no longer be exclusive following the TPP agreement.

NAFTA had a considerable impact on Mexico's beef industry, increasing imports of US beef into Mexico from under USD$300 million in 1995 up to nearly $1.8 billion in 2008 (Borror, 2014). Mexico remains a large factor in the US beef export industry, in 2013 they were second to Japan in terms of volume and third compared to Japan and Canada in terms of value (Borror, 2014). It is likely that Mexico, having the same NAFTA access with Canada, will face similar changes to their beef industries following the implementation of the TPP agreement.

2.2.6 Japan

Japan is a very protected market for beef, but also a very desirable export destination. They joined the TPP later in the negotiations but their inclusion may have a significant impact on global beef trade. Borror (2014) cites Japan as the second largest destination for U.S. in terms of volume and the highest value destination. Tariff reductions for Japan's beef industry will open their market and a number of TPP countries will compete for increased market share and access. Japan values higher quality cuts of beef and are large importers of premium beef.

Japan has entered into a recent trade deal – the Japan-Australia Economic Partnership Agreement (JAEPA) that may experience changes beyond those arising from the TPP. JAPEA would cut tariffs on frozen beef into Japan from 38.5% to 19.5% over 18 years with

an 8% cut in the first year and the tariff for chilled beef would drop from 38.5% to 23.5% over 15 years with 6% being cut in the first year (Kondo, 2014. pg.4). However, the TPP agreement will extend a lowering of the 38.5% tariff for exporting beef into Japan to 9%, which negates any cost advantage that Australia might have had over other TPP members. Figure 4 below shows the beef import market for Japan. It shows the effect of finding bovine spongiform encephalopathy (BSE or mad-cow disease) in US beef in 2003, which cut off trade and then slowly grew back from then on. Figure 4 shows the main source of beef for Japan, Canada would fit into the green top section, or "other," which is a very small portion of the current Japanese import demand.

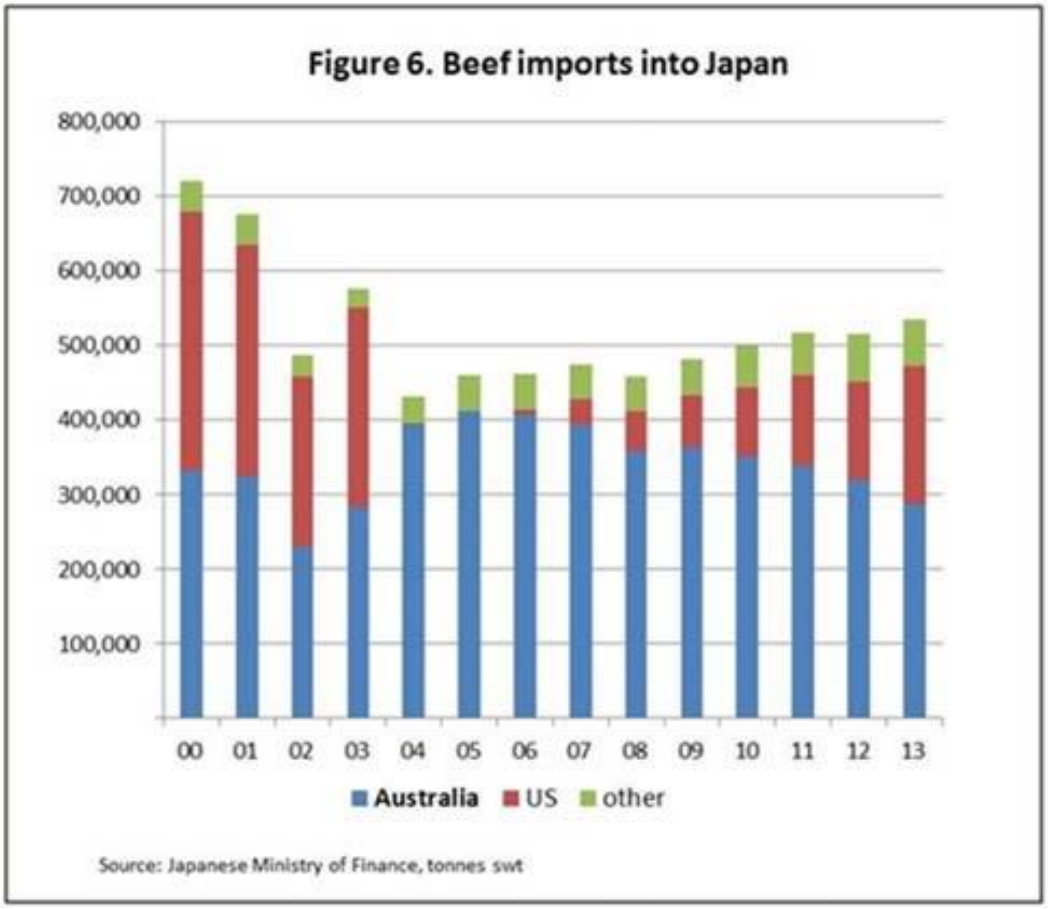

Figure 4. Beef Imports into Japan, vertical axis in tonnes swt (shipped weight)

Source: Kondo, 2014. Pg4

2.2.7 Chile

Chile is a small producer of beef but a large importer. They are members of multiple free trade agreements that influence their beef trade environment. Chile ranks number 25 in world production, producing just 0.39% of the global total (Cook, 2015). Although domestic production is relatively small with only 216,860 MT produced in 2015, down 3.2% from the previous year, in 2015 they increased exports by 106% due to a variety of factors (from 5,555 MT to 11,451 MT) including the recent opening of the Chinese market to Chilean beef (Gonzalez, 2016). Chile has a trade agreement with MERCOSUR countries (Argentina, Brazil, Paraguay and Uruguay) that is very important for their trade balance as these are the main sources for beef imports into Chile, with Paraguay being the main supplier (Gonzalez, 2016). Beef products from the MERCOSUR countries have a significant advantage as they enter Chile duty-free under the MERCOSUR-Chile FTA (USITC, 2003). Chile also has an FTA with the U.S. which provides Chile with unlimited access to the U.S. market with no duty or tariffs, however this has had minimal effect on Chile's beef trade due to the size of the industry and the nearby MERCOSUR countries remain the prime source for beef, likely due to the U.S.' stricter sanitary and phytosanitary requirements (USITC, 2003 pg. 64).

2.2.8 Malaysia

Malaysia has a small beef industry that produces enough beef to satisfy 30% of their domestic demand, although the intent is to increase this proportion. It must rely on imports to satisfy the remaining 70% of demand (Jamaludin et al, 2014). Malaysia

produces a small amount of beef, being the 40th largest beef producer in the world, with just 0.05% of global production (Cook, 2015). In 2011, Malaysia produced 46,510 MT of beef and consumed 154,400 MT. Hence, it is evident that Malaysia is minor producer and consumer of beef on a global scale, but relies heavily on beef imports (Jamaludin et al, 2014. Table 1). Beef is not a large part of the Malaysian diet. Consumption is much greater for poultry, pork, and eggs, comparing the 154,400 MT of beef consumed to one, two, and eight million MT of poultry, pigs, and eggs, respectively (Jamaludin et al, 2014. Table 1). However, it is likely that demand for beef will continue to increase. The main source countries for red meat (beef and lamb) being imported into Malaysia are India, Australia, and New Zealand, although it is worth noting that red meat from India is generally water buffalo meat (Australian Trade and Investment Commission, 2016). The Australian Trade and Investment Commission's report on Malaysian food and beverages notes that 60.4% of the population is Islamic, therefore Halal certified meat is a large market and that of Malaysia's total red meat imports, Australia accounts for 24.3% of those imports.

2.2.9 Brunei Darussalam

Brunei is a very small country, the smallest in Southeast Asia. It is a sultanate and has a population that is over 90% Muslim (Stanton, Emms and Sia, 2010a). The nature of the population's religious beliefs makes food security a large issue, namely in terms of ensuring that all imports meet their certifications. This is because the majority of the beef and sheep meat consumed is Halal certified and the country relies primarily on imports to meet their demands for beef (Stanton, Emms and Sia, 2010a). Livestock is a small part of agricultural production, with beef and buffalo production accounting for a negligible amount of the

livestock industry in 2008 while broiler chicken farms accounted for 66% of the industry (Stanton, Emms, and Sia, 2010a. Pg.6). Stanton, Emms, and Sia (2010a) report that only 3.5% of slaughtered bovine animals (176 head) in 2008 were locally produced, the rest were all imported live cattle (4,810 head). This is unique in that live cattle are imported in larger beef industries for the purpose of continued growth or finishing, otherwise it is the finished beef product that is generally imported. The strong halal requirement for Brunei's beef consumption is likely easier to meet when slaughtered within the country. The source of these live animals is primarily Australia, where "the Brunei Government's own cattle ranch at Willeroo in the Northern Territory of Australia is the main supplier," for the live animals and is reportedly larger that Brunei's land area (Stanton, Emms, and Sia, 2010a. Pg.9).

2.2.10 Peru

Peru is a small producer of beef and relies on imports for the country's beef consumption. Peru's beef production is small on the global scale, coming in at number 26 in global production, 0.35% of global production (Cook, 2015). This is primarily due to Peru not having a modern system in place for domestic beef production. Peru produced approximately 145,000 MT of beef per year on average between 2003-2012. This can be compared to 1 million MT produced in the U.S. per month (Nolte, 2013). Although Peru does not consume beef products as a staple, preferring poultry and fish, their beef imports have grown substantially, at an average of 24% per year between 2009-2012, with 64% growth in U.S. imports during that period (Nolte, 2013). Nolte, 2013, also cites the value of fresh and chilled beef imports in 2012 being USD$10.9 million with 32% of that market

share belonging to the U.S. and 21% belonging to their main competitor for Peruvian market share, Argentina. Frozen beef reached a value of USD$11 million in 2012, with U.S. as the leading supplier with 49% of those frozen imports. Brazil was second place with 21% and Uruguay in third with 12% (Nolte, 2013). Peru and the U.S. have recently reached an agreement that increased access to Peru for U.S. beef. Due to fear of BSE, there have been lingering trade barriers on U.S. beef since 2003, and yet there was still over USD$25 million in beef exports from the U.S. to Peru in 2015, and now Peru will allow beef from all federally-inspected beef farms (Rousseau, 2016. pg. 1). Peru is cited as "one of South America's fastest growing markets," and expected to increase their demand, helped along by the U.S.-Peru Trade Promotion Agreement (PTPA) which came into effect in 2009 (Rousseau, 2016. pg.1).

2.2.11 Singapore

Singapore is an important trading nation in Southeast Asia and is a key destination for exports trying to reach the entire region. It is almost entirely urban, hence, their domestic agricultural production is limited and, thus, it relies on imports to meet consumer demand. In terms of beef, "there is virtually no livestock industry in Singapore," with the exception of a lone government hog slaughter facility. The majority of meat imports come from Brazil, which has 30% of the market, followed by Australia, the U.S., and New Zealand (Enterprise Canada Network, Pg.3, 2013). Agriculture and Agri-Food Canada (2104) reports that Canada's share of 2013 meat imports into Singapore account for 1.7% of the share and are valued at $14.5 million, with Brazil holding a 42.3% share of meat imports. As a trading hub, Singapore also re-exports imported beef products to nearby countries; they imported

28,809 tonnes of beef between January and October of 2015 and exported 10,080 tonnes of that to Indonesia, and 3,625 tonnes to Malaysia (Meat and Livestock Australia, 2015a). The presence of BSE in U.S. beef in 2003 caused all imports of U.S. beef into Singapore to halt, and since 2006, Singapore has only accepted beef from animals under 30 months old (Export.gov, 2014).

2.2.12 Vietnam

Local production is important for Vietnam's consumers, although it is a system that is much less strictly regulated than beef production systems in developed markets. Vietnam is a relatively small beef producing nation, ranking number 27th in world production and producing just 0.35% of global beef (Cook, 2015). In 2007, Vietnam produced 206,000 tonnes of beef, much less than the 359,000 tonnes of chicken and 2.55 millions tonnes of pork (Stanton, Emms and Sia, 2010b). Producing beef is difficult in Vietnam, as it does not have a competitive advantage in cost of production. It is cheaper to import live cattle than to raise them in Vietnam. Domestic production data is also subject to distortion as live cattle are often imported, although cattle from Cambodia are considered local cattle once they enter Vietnam. Live cattle imports have reached very high levels of import value, compared to imported frozen and fresh beef. The value in recent years has increased considerably, from around USD$20 million in 2012 to nearly USD$80 million in 2013, with frozen beef reaching just over USD$50 million while fresh beef remains less than USD$10 million as of 2013 (Hoang, 2010).

Even though beef production is small, livestock production is important for Vietnam's rural communities and is important for consumers, as more than 95% buy their meat from local

market sources, through "highly localized distribution channels," … "most of which do not comply with any basic form of modern sanitary and hygienic standards," (Stanton, Emms and Sia, 2010b, Pg.3). The lack of regulation in Vietnam's domestic production makes its export opportunities very poor as many nations demand higher sanitary standards for incoming meat. Unlike many nations with highly developed agricultural industries, it is important to note that "Vietnam's system of recording imports of meat and poultry is still very weak and that its import data is highly inaccurate," (Stanton, Emms and Sia, 2010b, pg.1). Hence, much of the data is obtained from exporting countries.

Vietnam provides a market for imported beef as some consumers and supply chains do not trust the locally produced meat. Fresh and chilled beef imports accounted for 2% of meat and poultry imports in 2008, while frozen beef accounted for 53% of those imports, making fresh beef a less significant an import than frozen (Stanton, Emms, and Sia, 2010b). Imports of fresh and chilled beef have been on the rise, mainly due to Vietnam joining the WTO in 2007, increasing imports from 170 tonnes in 2004 to 2,182 tonnes in 2008 (Stanton, Emms and Sia, 2010b). In 2008, the imported fresh and chilled beef products came from the U.S. (81%), Australia (12%), New Zealand (3%), and Canada (2%); U.S. imports also spiked in 2007, however the report estimates that 2009 saw more imports from Australia and New Zealand, and less from the U.S. (Stanton, Emms and Sia, 2010b). Hoang, (2010) shows that the U.S. boom was temporary, as imports of fresh beef from Australia reached a value of nearly USD$5 million in 2013, while U.S. beef only reached USD$483,000, trailing New Zealand at US$1.1 million. The 2008 numbers from Hoang, (2010) also show that Australia exported USD$2.3 million of fresh beef to Vietnam while

the U.S. only exported USD$91,000 of fresh beef. This discrepancy in data shows the unreliable nature of Vietnamese data, as Hoang, (2010) cites the General Department of Vietnam Customs as the source and it diverges considerably from the Stanton, Emms, and Sia, (2010b) data which cites Official External Trade Statistics as their source. In any case, Vietnam is not a major market for beef exporters.

2.2.13 Other Suppliers of Beef to TPP Countries

Countries included in the formal modelling for this thesis denoted Non-TPP include Brazil, Argentina and Uruguay which are treated separately as a group because these are major beef producing and exporting nations. Brazil, in particular, is the world's second largest beef producer, with approximately 17% of the global beef market (Cook, 2015). The United States leads Brazil followed by the European Union in production, with the three combined producing 48% of the world's beef (Cook, 2015). Argentina is the world's sixth largest beef producing nation, with 4.69% of global production. Uruguay is also a strong player, being the sixteenth largest producer, with 0.97% (Cook,2015).

2.2.13.1 Brazil

Brazil is the world's second largest beef producer and the largest exporter of beef in South America. In 2013, Brazil exported 1.35 million tonnes of beef to approximately 130 different countries, making their exports very significant in global beef trade (Perkins,

2013). Although Brazil is second in global production, they were the largest exporter of beef in the world in 2013 and continues to seek agreements to improve access, such as the lifting of Russia's ban on Brazilian beef (Perkins, 2013). As a large global competitor, Brazil is continually seeking to improve health and production practices.

2.2.13.2 Uruguay

Uruguay has access to all major beef markets except Japan due to their practice of vaccinating for FMD. Uruguay's beef exports, however, still account for 5% of all traded beef and they have a solid system of traceability and production in place (Bervejillo 2015). In 2013, Uruguay's beef exports reached 355,000 tonnes in carcass weight (255,000 tonnes of fresh beef), 90% of which was boneless. "of which 75% is frozen beef and 15% chilled beef," with the chilled beef being sold for a higher price, about 88% higher on average (Bervejillo, 2015, pg.5). The main destinations for Uruguay's beef exports tends to fluctuate by year, but the main importers are the EU, China, MERCOSUR, NAFTA, Russia, and Israel (Bervejillo 2015).

2.2.13.3 Argentina

Argentina has been, at times, a very large exporter of beef, it was the third largest beef exporter in the world in 2005 and exported approximately 745,000 metric tonnes, which can be compared to the U.S.' 2005 exports being 472,000 metric tonnes (Queck, 2013). However, their export industry has declined since then, with one factor being a 15% export tax intended to lower the domestic price for consumers. It should be noted that the current government seeks to abolish that tax and work on rebuilding Argentina's agricultural

sector. They have fallen to eleventh in terms of global beef exports, exporting just 164,000 metric tonnes in 2012 (Queck, 2013). The export opportunities for Argentinian beef have been improving, with a 2016 forecast of up to 260,000 tons exported; with the main destinations being China, the EU, Chile and Israel, which account for 80% of exports (Joseph, 2015). The U.S. is a strong potential destination for improved exports, particularly if the new government lifts export limitations and due to the USDA reopening their market to Argentina's fresh and frozen beef in June 2015 (Joseph, 2015).

All other countries besides the 12 TPP members and the three individual Non-TPP countries will be considered the Rest of the World (ROW) for this thesis. This combined ROW is a small part of the TPP beef market and hence will be excluded from the formal modelling exercise.

The major beef producing nations that will not be accounted for individually are the European Union (12.9%), China (11.55%), India (7.19%), Pakistan (2.95%), and Russia (2.32), representing 36.91% of global production (Cook, 2015). Although representing a significant portion of global production, these ROW countries do not represent a significant part of TPP trade in beef. The European Union (EU) exported 600,195 tonnes of beef and live animals in 2015, with the top three destinations being Turkey (9.6%), Lebanon (8.4%), and Hong Kong (7.5%) with 31.3% in other destinations (European Commission, 2016). The EU imported 322,723 tonnes of beef and live animals in 2015, primarily from Brazil (42.4%), Uruguay (14.3%), Argentina (13.1%), Australia (9.6%) and the U.S. (7.5%) (European Commission, 2016). China is a large importer of beef and also exported

approximately CAD$205.3 million in beef in 2011, with the main destinations being Hong Kong (29.2%), Japan (26.6%), and Kyrgyzstan (12.5%); CAD$26.8 million worth of total exports was fresh or chilled boneless beef (Agriculture and Agri-Food Canada, 2013). India is the world's large exporter of beef (23.5% of global beef exports), exporting 2.4 million tonnes in 2015, compared to Brazil's 2 million tonnes and Australia 1.5 million tonnes, however it is very important to note that India only exports water buffalo meat which is classified as beef by the U.S. government (Raghavan, 2015). For the purpose of this thesis, water buffalo meat will not be considered beef. Pakistan has been expanding its global meat trade presence and generally focuses on halal-certified markets. Pakistan was the third largest supplier of beef and beef products to the GCC (Gulf Cooperation Council, which consists of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and United Arab Emirates) with USD$ 25 million in fresh or chilled meat of bovine cuts with bone-in (Agriculture and Agri-Food Canada, 2015). Russia is a significant importer of beef, once the world's largest, however, since 2013, Russia has closed its borders to producers such as the U.S., Australia, Canada, Norway, and the EU over restrictions on feed additives as well as a 2014 trade embargo (Schuele, 2015). Russia is not self-sufficient in beef production and relies on imports, which were down 31% from Jan-July of 2015; the main sources for imports at that time were Brazil (92,689 MT), Belarus (69,803 MT), Paraguay (58,483 MT), Argentina (29,551 MT), Uruguay (6,262 MT), and New Zealand (4,357 MT) (Schuele, 2015).

The main beef producing countries that are within the ROW, the EU, China, India, Pakistan, and Russia, do not have a large impact on TPP beef trade. They do import large amounts from TPP/Non-TPP countries and China exports beef to Japan (see Figure 1). China's

exports to Japan are not important enough to impact TPP beef trade. Within the Non-TPP countries, it is important to note that beef from Argentina and Brazil has been banned for importing into countries such as the U.S. due to the presence of foot-and-mouth disease (FMD). The U.S. has recently lifted this ban, but only on beef from Northern Argentina and approximately half of the Brazil's states (Food Safety News, 2015). Restrictions also exist on beef from Uruguay, but no ban was imposed. The previous ban may distort trade data from the chosen base year in the formal model used in this thesis.

Clearly, there is a great deal of diversity in the beef industry which provides beef to TPP markets. The negotiations have been concluded for the TPP agreement and an official text has been released, the next step will be sufficient ratification of the agreement by the member countries. The negotiations and eventual agreement are examined in the next chapter.

Chapter 3: Evolving Trade Negotiations

3.1 Inception of the TPP

Negotiations for the Trans Pacific Partnership (TPP) began as a much smaller undertaking than the large trade agreement that it became. The Trans-Pacific Partnership (TPP) agreement is a potential free trade agreement that currently involves 12 members that have agreed, but not ratified, the pact. The member countries which were involved in the negotiations were the United States, Japan, Brunei Darussalam, Australia, New Zealand, Chile, Malaysia, Peru, Singapore, Vietnam and Mexico, as well as Canada. The agreement covers a wide range of products and is noted for including arrangements pertaining to intellectual property. This thesis focuses on two trade agreements and utilizes the details within them to analyze their effects and impact.

Table 1. Trade Agreements and their Members

Trade Agreement	Member Countries
Trans Pacific Partnership (TPP)	Canada, United States, Mexico, Australia, New Zealand, Japan, Chile, Malaysia, Peru, Singapore, Brunei, and Vietnam
North American Free Trade Agreement (NAFTA)	Canada, United States and Mexico

Beef has been a sensitive trade issue in the past for some of the TPP member countries, and the late addition of Japan to the negotiations is notable due to its resistance to past and current beef imports. The TPP, or as it was originally named, the Trans-Pacific Strategic Economic Partnership, was first "conceived in 2003 by Singapore, New Zealand, and Chile as a path to trade liberalization in the Asia-Pacific region" (Fergusson and Vaughn, 2010, pg.1). The P4 trade bloc, formed in 2006, consists of New Zealand, Singapore, Brunei, and Chile; they "aimed to eliminate all tariffs between the parties to the agreement by 2015," (Krist, 2014, pg.5). Krist (2014) notes that the United States, Australia, Peru and Vietnam then joined in 2008, followed by Malaysia in 2010, with Canada and Mexico joining negotiations in early 2013. The negotiations were criticized by some for being held in secret and anti-trade activists argue that the deal would cause job loss and weaken certain sectors of their economy. The deal did not meet its initial deadlines, likely due to increased complexity as new countries joined the negotiations (Kerr, 2013). Damodaran (2014, pg.1) cites "differences between Japan and the US as the main reason for the impasse," due to being "at odds over Japan's tariffs on its five farm product categories, which include rice, pork and beef," as one of the reasons the agreement was delayed. Beef was only one of a number of contentious issues that had to be navigated.

3.2 End of Negotiations

Negotiations regarding the approximate 30-chapter trade deal, representing 40 percent of global GDP, reached its conclusion in the U.S. city of Atlanta on October 5th, 2015. It is clear that there are a few particular issues that were holding up the negotiations as some large member countries' economies are heavily invested in those sectors. It appears as though

the main sticking points were over "rules of origin for automobiles, dairy and sugar market access, and the data protection period for biologic drugs," (Bridges, 2015, pg.2). The formal legal agreement was signed by all member countries on February 4th, 2016 in New Zealand, and the next step towards implementation is the ratification of the agreement by each country's government.

Canada experienced a change in government following the end of negotiations for the TPP. A Liberal government replaced a Conservative administration in the fall of 2015. Although the agreement has been signed by the new Canadian government, it has been made clear by the new International Trade Minister, Chrystia Freeland, that signing the document does not mean it is ratified. Signing the document is one step in the process, and allows the document to be "tabled in Parliament for consideration and debate before any final decision is made," (Blatchford, 2016. pg. 1). Each country has up to two years to consider ratifying the document and then a final decision must be made. The trade agreement can only take effect if it "ratified by half the participating countries representing 85% of the proposed trade zone's economy," (Blatchford, 2016. pg.2). The next step for each country include having the agreement undergo extensive evaluation, analysis of impact, and public consultation before ratification, or not. Ratification became an issue in the US.

3.3 Text of the Agreement

The full text of the agreement was released on November 5th, 2015 and the legally verified text was released on January 26th, 2016. The latter allows for full analysis of the text. The

text must now also be translated, reviewed, and undergo the domestic process for ratification in each member country.

The elimination or reduction of tariffs on chilled beef vary by country, some will see no change in their tariff rate, small reductions are effective EIF (Entry into Force), and the larger reductions occur over a number of years. This thesis will examine the changes to tariff line HS 020130 for boneless fresh and chilled beef. Japan has the longest reduction schedule with 15 years to reduce their 38.5% rate down to 9%. Canada, U.S., Mexico, and Peru have the second longest schedules with either 10 or 11 years to reduce to zero. The U.S. has various conditions and specifications written into their reduction schedule, this thesis will use the reduction schedule provided for 'not processed' beef, as this covers most chilled boxed beef and refers to HS line 0201.30.8000. This aligns with the data used from the HS line 020130 from the UNCTAD TRAINS (United Nations Conference on Trade and Development-Trade Analysis Information System) database with cites the maximum U.S. rate tariff rate for HS 020130 to be 26.4% which is consistent with the base rate given for HS 02013080 in the TPP text. The U.S. reduction schedule for this HS line has removal terms that differ between countries. Most of the member countries will get total removal of the tariffs at the date of EIF, except for Vietnam, which will take 3 years, and Malaysia and New Zealand, which will take 5 years. The U.S. also has a tariff rate quota for Japan that will end by Year 15, but until then will increase from 3,000 MT up to 6,250 MT before removal. The U.S. has a tariff rate quota in place on Japanese beef at the amount of 181 tonnes, which was only 92% filled in 2015 (USDA, 2016). The U.S. is likely to retain tariff rate quotas on beef from countries with whom they did not have a previous free trade agreements and

that have high value beef exports that could potentially impact domestic beef. Australia will also remain at the initial rate until December 31st, 2021. Peru will also be restricted by the rates established in the United States-Peru Trade Promotion Agreement. None of these specific conditions attached to the tariff reduction schedule will remain after Year 15. This thesis will use a 15-year projection as this is the longest reduction phase length and therefore the results will be the post phase-in results of the agreement; that is, after all the tariff changes have been fully implemented.

3.4 The TPP and Canada's Trade in Beef

Canada's beef trade environment can expect to experience major changes following the full implementation of the TPP agreement. A number of the countries involved are major export and import destinations within Canada's beef trade and the elimination and reduction of tariffs can be expected to have an impact. Global Affairs Canada (2015a) acknowledges the importance of beef within the TPP agreement due to the $1.3 billion worth of beef and beef products that Canada exported to TPP member countries each year from 2012-2014, with the main destinations being the U.S. (83%), Mexico (10%) and Japan (6%).

Canada has a system of tariff rate quotas for non-NAFTA countries that restrict the beef being imported, the within quota tariff rate is zero and will remain so. The over quota tariff rate is 26.5%. Canada allocates the quota through an import licensing system that requires import permits for beef and veal, with total quota access quantity of 76,409 tonnes. Within this limit, New Zealand has a country-specific reserve of 29,600 tonnes and Australia has a reserve of 35,000 tonnes. Both Australia and New Zealand also have access to the

remaining 11,809 tonnes after they've used up all of their country-specific reserve (Global Affairs Canada, 2015b). Canada will phase out the 26.5% over access commitment tariff for all member countries by year 6 with the exception of Australia, which will take until year 11.

The inclusion of Japan and their concessions regarding tariffs on beef will likely prove to be the most important for the large beef exporting countries. However, the competition for current and new markets will increase as these major exporters will be trading under the same preferential trade agreement and will be subject to the same tariffs, without preferential access for any TPP member country. Year 1 in the text refers to the first full year following the ratification of the agreement starting the March 31st after the date of the TPP entering into force.

3.5 Future of the TPP Agreement

The TPP agreement has not been fully ratified at the time of this thesis. There are current political considerations that threaten the completion of the process to have the agreement fully enter into force. The biggest threat is the membership of the United States, without whom, the agreement cannot be fully concluded. Both the US and Japan must complete the ratification process in order for the agreement to meet the minimum requirements for the agreement. Japan moved forward with the agreement, voting to ratify the Trans Pacific Partnership on December 9th, 2016.

The year 2016, as member countries are moving forward with the ratification process, was an election year for the United States. While the administration of president, Barack Obama, supported the TPP, Donald Trump of the Republican Party has spoken out against the TPP, claiming he opposes it and will ensure that it will never be implemented. In a video outlining his plans for his first day in office, he promised to withdraw the U.S. out of the TPP, citing it as a "potential disaster," (Reuters, 2016). The Trump transition team policy advisor has also said that the TPP is dead, and so are any large multilateral agreement like it, and that the focus will be on pursuing smaller bilateral agreements (Reuters, 2017). In the days following his official inauguration, Donald Trump followed through on his promise and signed an executive order for the U.S. to withdraw from the TPP, which cannot go forward without the U.S. due to its GDP participation requirements.

3.6 The Potential for an End to NAFTA

In his campaign, Donald Trump voiced his opposition to NAFTA, with him quoted as saying, "I would pull out of NAFTA in a split second, "and "It's the worst trade deal ever signed in the history of this country and one of the worst trade deals ever signed anywhere in the world. NAFTA is a disaster," during the first of three debates between presidential candidates, as recorded by Bloomberg Politics, 2016. Donald Trump compared the TPP to NAFTA and promised to re-open the agreement for renegotiation or, failing that, a U.S. exit from the NAFTA.

With regards to how easy it would be the US to back out of NAFTA, there is within NAFTA a provision found in Chapter 22, Article 2205, that describes the process for withdrawal from the agreement. It reads:

"Article 2205: Withdrawal
A Party may withdraw from this Agreement six months after it provides written notice of withdrawal to the other Parties. If a Party withdraws, the Agreement shall remain in force for the remaining Parties." (Global Affairs Canada, 2015c)

The 2016 U.S. election concluded with a victory for the Republican candidate, Donald Trump. Trump's win threatens the future of NAFTA due to his criticism of the deal during his campaign. It is likely that the new government will seek to renegotiate the trade deal, with the results of such a renegotiation unknown. The loss of NAFTA in particular would have a large impact on Canada as the US and the Canadian import/export markets are largely integrated. An examination of a return to the pre-NAFTA trade regime for beef is justified given the current political uncertainty.

Chapter 4: Modeling Approach

4.1 Ways to Model International Trade

Trade agreements between countries are generally expected to increase trade among members and possibly global trade. This is one of the reasons preferential trade agreements among a subset of WTO members have a place in the WTO. Since the end of the WTO's Uruguay Round in 1994, it has proved impossible to negotiate a major multilateral agreement to liberalize trade, so the trade agreement environment is made up of many different agreements between subsets of WTO members, all layering and building upon each other. The TPP is notable for being a large agreement that encompasses a considerable number of countries and includes a large percent of global GDP. At the time of writing, the TPP has not been fully ratified, therefore there is no Entry into Force (EIF) date available. In this research it is first assumed that all member countries will agree to ratify the TPP and it has come into force. One of the biggest challenges in analyzing a change in trade rules using a model is deciding whether to use a general or partial equilibrium model. There are numerous studies that have been completed using both general and partial equilibrium models. General equilibrium models tend to be larger and more complex as they take into account the economy of a country as a whole instead of focusing on the movements and effects of a single product or industry. General equilibrium models have to be undertaken at a high level of aggregation and, hence, are not particularly useful for examining the implications for an individual industry or sector.

Many models exist that assist in modelling various international trade situations, both partial and general equilibrium. Developing a model based around trade theory has many different approaches, Pollins (1982) describes four general approaches to creating a trade model useful for policy.

The four different types of models and a major example of such models are described as follows:

1. Transmission models: relationship between domestic and international markets and how one country's economic activity transfers to others such as the LINK project.
2. General equilibrium: simultaneous equations driven by an objective function and subject to specified constraints exemplified by the UNITAR Project on the Future[2], the FUGI model[3], and the Global Input-Output Model or GIOM.
3. Supply/demand/price adjustment: handle the relationship between supply, demand and price. These are partial equilibrium models. They utilize a market-clearing approach that operates when the regions are represented by separate production and demand sectors, popular for models examining single-commodity markets. There are many different models such as the Model of the International Relations of Agriculture (MOIRA), the International Petroleum Exchange Model (IPE) and the World Integrated Model (WIM) all use slightly varying demand adjustment structures. "The greatest potential of this modelling approach for international relations would appear to be in the issue area of

[2] The U.N. model by Leontief and Stern, executed by Carter and Petri, used 15 regions and 45 separate commodities and aggregated import demand figures into a single pool that then assumed that each region held a constant share of the world market which does not permit the monitoring of changing market patterns, which over 20 years is dubious (United Nations, 1976).
[3] The FUGI model by Kaya and Onishi which was a static, general equilibrium macromodel (Onishi, 1983).

primary commodity markets," (Pollins, 1982. pg. 519). This approach allows a way around the troubling notion of fixed shares over longer time periods, making this approach more appropriate for changes in trade and for fluctuating market prices and market shares.
4. Discrete decision algorithm: identified by the nondeterministic solution strategy and direct incorporation of political factors. This method casts the geographic regions as consumers and focuses on meaningful dyadic trade flows and not the global pooling that other approaches utilize. These models do not perform well when the goal is to measure flows between specified pairs of countries, a major example of a discrete decision algorithm model is the SARUM-Systems Analysis Research Unit of the British Departments of Environment and Transport or SIPER-Simulated International Processor.

Pollins (1982) also describes two approaches to viewing the global marketplace, either viewing each country's relation to the global market as a net importer or exporter, or viewing all the included region's as a single global pool that is arrived at by aggregating those region's import demands and export supplies thereby creating a world market. The characteristics of a model that are necessary to answer a research question can only be determined once the model's purpose has been defined.

These model descriptions can be more simply distinguished as either a general or a partial equilibrium approach. There are a number of studies and models utilizing both partial and general equilibrium models of trade, including the GTAP model, the SMART model, the SWOPSIM framework models, the MTM model, the FAPRI/CARD model, the GSIM model

and various other adaptations and updated versions of historical models. This thesis adapts the GSIM model.

The GTAP (Global Trade Analysis Project) modeling framework is commonly used and adapted for studies in trade. It includes a large database and is a common base for many models, both general and partial equilibrium. It is coordinated by the Center for Global Trade Analysis at Purdue University.

The SMART model (single-market, partial equilibrium trade simulation model) is generally considered the predecessor of the GSIM model due to the similarities in use of data sources such as TRAINS (Trade Analysis Information System) and WITS (World Integrated Trade Solution). SMART was the model of choice for the General Agreement on Tariffs and Trade (GATT)[4] and was useful, like GSIM, for analyzing the effects of changes to specific categories of various products, however, GSIM claims to have improved upon models such as SMART by making use of the increased computational power that's been developed in subsequent years.

SWOPSIM (Static World Policy Simulation) is a modeling framework developed by Roningen (1986) for the United States Department of Agriculture's Economic Research Service. This framework can be used to create static partial equilibrium models, and was used by the USDA for analysing various trade issues such as the effects of liberalization on certain commodity prices, production, and trade. Haley (1988) describes the use of

[4] The General Agreement on Tariffs and Trade existed from 1948 until 1994 during the Uruguay Round of Agreements when the World Trade Organization was established.

SWOPSIM in joint-product models and notes that SWOPSIM models are characterized by their static supply and demand equations, spreadsheet use, and subsidy equivalents to analyse the effect of government policy on trade. The Trade Liberalization Model (TLIB) arose from the SWOPSIM framework for use during GATT negotiations and consisted of 22 different commodities and 36 regions.

The Ministerial Trade Mandate Model (MTM) is another useful model for analyzing aspects of world trade (Huff and Moreddu, 1990). It is a comparative static model that incorporates a range of agricultural commodities and is intended to determine the results of reducing domestic protection measures and policy changes. It also utilizes aggregated supply and demand elasticities that vary for each country or agricultural region. It describes examples using a single-product, as well as with a more complete set of products and notes that cross-price elasticities in the single-product case are seen as substitutes instead of complements.

The Food and Agriculture Policy Research Institute (FAPRI) has developed and maintained a multitude of trade models, including the FAPRI International Livestock Model also known as the FAPRI/CARD International Livestock and Poultry Model; all of the FAPRI models are partial equilibrium models that are non-spatial and econometric. This model solves using a market-clearing world price to balance trade while also taking into account trade restrictions. It is intended to analyse the results of certain policy measures and focuses on the chain of production for livestock and poultry.

Kiyota and Stern (2007) used the Michigan Model of World Production and Trade to determine the economic effect of a free trade agreement between the U.S. and Korea. It is a general equilibrium model (CGE) and includes trade and market structure aspects such as imperfect competition. Like many frameworks and models, it was adapted for the purpose of the study of a bilateral free trade agreement. The study uses both static and dynamic computation and analyses the result of a unilateral removal of trade barriers by Korea, the U.S., and all countries included in the model. The study by Kiyota and Stern (2007) also employs the Armington assumption of product differentiation in one of its two production stages and cites that this may result in some monopoly power over a region's trade and create substantial yet implausible terms-of-trade effects. A second stage differentiates product by firm. They also use an elasticity of substitution equal to 3 for different varieties of goods and a CES production function in the second stage.

McKibbin et al (2004) used the Asia-Pacific G-Cubed Model to solve for the effects of a free trade agreement between Korea and Japan. This model is an expansion on the G-Cubed model developed by McKibbin and Wilcoxen (1999) that expanded on the standard computational general equilibrium models to allow for a dynamic intertemporal approach. This model allows for a more long-term view of the effects of policy changes because it allows for a forward-thinking rationale. The G-Cubed model allows for a multi-sector and multi-region analysis but has been adapted for a bilateral FTA simulation and is able to analyze the policy effects of various scenarios, including trade liberalization.

Francois and Hall (1997) describe the advantages of partial equilibrium modelling in economics due to its fast and transparent application to a wide range of topics. A partial equilibrium study does not deliver a complete picture of the entire economy, which makes it important to be very mindful of the limitations of partial equilibrium studies, but are useful for looking at a simpler cause and effect resulting from a policy. Francois and Hall (1997) describes an approach to partial equilibrium modeling that is comparative, static, and includes products that are either perfect or imperfect substitutes, with the Armington assumption for imperfect substitutes. The result was the COMPAS model that used log-linear equations within a single market. Francois and Hall (2003) built upon these foundations to create the Global Simulation Model (GSIM) that allows for more modern computation, multilateral market effects, with similar underlying theories and has proved to be a popular tool. Thus it is an appropriate model to examine the effect of the TPP on the beef sector.

4.2 GSIM Model: Structure and Data Requirements

For the purposes of this study, it has been determined that the model developed by Francois and Hall (2003) will be used. The model allows for a partial equilibrium analysis of a single industry with multi-regional compatibility. This study will focus on the beef industry and encompass 15 regions. The GSIM model is useful due to its transparency, ease of customization, and the emphasis on using global market clearing conditions to determine the new world price.

The data requirements for this model includes bilateral trade flows, a bilateral tariff matrix for initial and final tariffs, import demand elasticities, export supply elasticities, and

elasticities of substitution. The results of the model following the recalibration of the tariffs include changes in trade flows, welfare, producer and consumer surplus, tariff revenue, price and output. This model assumes products are imperfect substitutes for imports and uses a constant elasticity of substitution. The model differentiates the product using the Armington (1969) assumption, which differentiates the product based on production origin. Thus each region's beef will be differentiated based on the region it originates from. This assumption would be complicated if the beef industry as a whole were utilized due to the trade and slaughter of live cattle across region borders. Therefore, the industry will be disaggregated to focus on the finished beef product, or chilled boxed beef, under the six-digit HS code 020130.

The trade liberalization arising from the lowering of some of the tariffs in the model will be treated as an exogenous shock to the multi-region trading environment that is established.

4.3 Previous uses of GSIM

There are numerous examples of previous uses of the GSIM model developed by Francois and Hall (2003). Despite the large number of trade models available, the GSIM has been a popular choice among researchers for a variety of topics. The model is attractive due to its flexibility, adaptability, and relatively simple input requirements.

Tung (2016) studied the effects of the TPP on Vietnam's livestock industry using the GSIM model. Trade data from the UN Comtrade Database for 2013 was used, at the six-digit HS

code level. This data was aggregated in 9 sub-sectors, including bovine meat and included data for domestic absorption in three of those sub-sectors. Tariff data was sourced from the Market Access Map database from the International Trade Centre or UNCTAD/WTO. The tariff values were calculated as an average for the sub-sectors. The elasticity of substitution utilized was 5, but the analysis used a value of 7.5 following a sensitivity analysis. The import demand elasticity used was -1.25 and export supply elasticity was 1.5, both sourced from the example provided by Francois and Hall (2003). The analysis found that the removal of tariffs and non-tariff barriers would have a negative impact on Vietnam's livestock industry due to its non-competitive nature, however it would have a positive impact on consumers due to the increased competition. It was also found that the livestock industries of highly competitive livestock countries with comparative advantages for production, such Australia, New Zealand and the U.S., would see the largest increase in welfare benefits and also the largest losses in consumer surplus. Canada, Japan, and Mexico would see large gains in consumer surplus but with a large loss in producer surplus, resulting in net welfare gains in the livestock sector.[5]

Istaitieh (2006) used a partial equilibrium Vinerian (Viner, 1950) model of trade to study the economic effects of a proposed FTA between Japan and the UAE. The model used in this study was constructed in a similar style to Francois and Hall (2003) in that it utilizes export supply and import demand functions to show a log-linear or percent change result for the economy. The study utilizes very similar import requirements and includes more

[5] It should be noted that this study was published in 2016 and has yet to be peer-reviewed at the time of writing.

than 12 regions. The trade data was sourced from the International Trade Statistics Yearbook of 2005 that was published by the International Monetary Fund (IMF), the tariff data was from the WTO Statistics Database 2006 (ad valorem and MFN applied) and the Gulf Cooperation Council (GCC) Customs Union Book of 2004 (for the UAE). Elasticities were sourced from a secondary literature- a study on an EU-GCC FTA by De Rosa and Kernohan (2005). The study resembles Francois and Hall (2003) by using elasticities of substitution in the model however they used three different scenarios due to lack of sufficient data, the scenarios use elasticities of substitution that are inelastic (0.5), unit elastic (1), and elastic (5). The different elasticities of substitution revealed different export: import growth rates, ranging from 2: 3%, 3: 5%, and 15: 22% respectively. The elasticity of substitution value of 5, used by Francois and Hall (2003) and a number of other studies, indicates a plausible and more realistic value that allows for stronger results, as seen in the study by Istaitieh (2006).

Burkitbayeva and Kerr (2013) used the GSIM model to model the effects the changes in world wheat trade due to the black sea region producers becoming members of the WTO. WTO members are entitled to receive MFN or Most-Favoured Nation tariffs and the recent or likely addition of three large wheat producers, Ukraine, Russia, and Kazakhstan, was simulated to determine the effects of these nations receiving MFN tariff rates. The results determined that the increased access led to increased trade between the three countries and other large market without negatively affecting the other large global wheat exporters. There was also some loss in market access to some markets due to the diversion of trade flows due to new access routes. Their simulation included 24 trade regions and sourced

data from the base year of 2007 as none of the three countries had yet joined the WTO at that time. Bilateral trade data was sourced from the trade statistics for international development or Trademap, of the International Trade Center at the four-digit HS level. The bilateral tariff data was sourced from the market access map database or MacMap, of the International Trade Center and the Centre d'Etude Prospectives et d'Informations Internationales, the WTO's Tariff Download Facility, or Tariffdata, and Tariff Analysis Online, and the WITS database from the World Integrated Trade Solution by the World Bank. Import demand elasticities were from Kee, Nicita, and Olarreaga (2004), and an export supply elasticity value of either 0.5, 1, or 1.5 was used depending on the size of the country. The elasticity of substitution used the value of 5 consistently as per Francois and Hall (2003).

Porto (2007) used the GSIM model as part of an empirical analysis done to measure the income and consumption effects of CAFTA on agricultural goods and production. The import demand elasticities were sourced from Kee et al (2004). Bilateral trade and tariff data were sourced from the WITS-TRAINS database (Trade Analysis Information System) at the six-digit HS level for the six CAFTA-DR nations and a simple average was used for the remaining regions in the Non-CAFTA-DR model. Welfare results were manipulated by multiplying the price changes from the GSIM model by the budget shares for household information derived from ENCOVI, the Living Standards Measurement Survey in Guatemala.

Serletis and Fetzer (2008) use the GSIM model to determine the effects of the quota buyout for the U.S. tobacco industry. Their study used data on tobacco products costs and source

elasticity estimates from tobacco literature. The simulation found that following the buyout, shipments of U.S. produced tobacco increased while foreign-produced tobacco shipments fell for both U.S. and foreign markets. They assumed a range of supply elasticities and when they assumed a higher elasticity of supply, they found that the market price for U.S. produced tobacco would fall by an estimate of 20-23 percent, whereas foreign-produced tobacco would fall by less than one percent. Bilateral trade data was sourced from suppliers and estimated from farm sales weight. Elasticity of substitution estimates ranged between 1.10 and 5.40.

The GSIM model was used to study the opening of arctic transport routes on global maritime trade in a thesis by van den Broek (2014). The study uses a few scenarios, both climatological and aggregated, but includes a focus on the supply and demand of various locations and what changes would occur from the increased economic viability of better access to Arctic routes. Bilateral trade data was sourced from the Clarkson's 2013 report and converted using data from the Federal Energy Regulatory Commission. The supply elasticity used was 1.5 and the elasticity of substitution was 10, as was done by Francois and Hall in 2003. Import demand elasticities were sourced from the World Bank, the author's own reasoning, and secondary literature.

Leudjou (2012) used the GSIM model to analyse the effects on Cameroon's dairy sector following tariff reductions from the Doha Round and to measure the impact on food security of the country. Globally, dairy is a generally very protected sector and holds economic importance in Cameroon, which has numerous advantages to producing dairy. This version of the model used 23 countries and sourced bilateral trade data from

Comtrade Database from WITS. Bilateral tariff data was sourced from the market access map database, or MacMap, of the International Trade Center and the *Centre d'Etudes Prospectives et d'Informations Internationales.* Import demand elasticities were taken from Nicita and Olarreaga (2006), with the exception of South Africa's value coming from Kee, Nicita, and Olarreaga (2004) and the default value of -1.25 for the EU coming from Francois and Hall (2003). Export supply elasticities were either 1.5, from Francois and Hall (2003) or 0.5, depending on the size of the country as per Holzner (2004). Elasticity of substitution was constant for all countries and equal to 5, as is used by Francois and Hall (2003).

As can be seen the GSIM model is flexible, has been widely used and generally accepted as a useful tool for analysing changes in trade relationships. Its data requirements can generally be met from consulting published sources.

Chapter 5: Data Sources and Model Equations

5.1 Model Equations

The model uses a variety of equations that incorporate the data and model input requirements and are solved to produce trade changes. There are ten equations that lead to revenue and welfare effects and these include steps that evaluate the model's demand, supply, and market equilibrium to provide results for the regions, representing a large portion of global beef trade, included in the model. The model is built around a methodical mathematical step by step structure that includes the calibration of own and cross price elasticities, which are then used to create market clearing conditions, all using the computational power of Microsoft Excel Solver. By computing the global clearing price from the market clearing conditions, the model is able to back solve in order to determine results for each region. Francois and Hall (2003) utilize a simple percent change, or log-linear, representation of import demand with common export supply equations.

In Francois and Hall's (2003) GSIM model, each importing country has an import demand within the product category that is a function of the exporting country's industry price and total expenditure on the product category. The import demand is seen in equation (1):

$$M_{i,v,x} = f(P_{i,v,x}, P_{i,v,\neq x}, Y_{i,v}) \quad (1)$$

Where imports, M, is equal to a function of domestic price, P, and product, *i*, in the importing country, *v*, and the exporting country, *x*. The expenditure of importing the country, v, on the product, i is $Y_{i,v}$ while $P_{i,v,x}$ is the domestic price for product, i, in the exporting country, x. $P_{i,v,\neq x}$ is the price of other varieties.

Following Francois and Hall (2003) using the Slutsky decomposition of partial demand, while utilizing the zero homogeneity property of Hicksian demand, the GSIM model is able to differentiate equation (1) into the own- and cross-price elasticities below in equation (2) and (3).

(2) $N_{i,v,x} = \theta_{i,v,x}(E_{M(i,v)} + \sigma_{i,v})$

where $N_{i,v,x}$ is the cross-price elasticity, $\theta_{i,v,x}$ is the expenditure share of the product, *i*, that is exported by country, *x*, Where $E_{M(i,v)}$ <0 is the composite import demand in the importing country ,*v*, and $\sigma_{i,v}$>0 is the elasticity of substitution in the importing country, *v*, for product ,*i*, that has been exported by different regions.

(3) $N_{i,v,\neq x} = \theta_{i,v,\neq x}\, E_{M(i,v)} - (1 - \theta_{i,v,\neq x})\sigma_{i,v}$

where $N_{i,v,\neq x}$ is the own-price elasticity of the import demand function in the importing country, *v,* for the product, *i*, that is exported by country *x* when the price of product, i, from any of the other countries, $\neq x$ changes.

Aggregate import demand elasticity, $E_{M(i,v)}$, is defined in equation (4) for aggregate imports, $M_{(i,v,)}$ and composite price, $P_{(i,v)}$.

(4) $$E_{M(i,v)} = \frac{M_{(i,v)}}{P_{(i,v)}} \frac{P_{(i,v)}}{M_{(i,v)}}$$

Next, it is necessary to estimate the domestic demand for the product by using each region's supply functions in order to specify the full-market clearing price in order to get global clearing conditions.

Export supply to the global markets is a function of the world price, P*, and exports of the exporting country, $X_{i,x}$, which is defined in equation (5) below:

(5) $X_{i,x} = f(P_{i,x} *)$

Which can be differentiated and then rearranged in terms of percentages to get the full definition of the export supply elasticity:

(6) $E_{X(i,x)} = X_{i,x}/P *_{i,x}$ or $E_{X(i,x)} = \frac{X_{(i,x)}}{P*_{(i,x)}} \frac{P*_{(i,x)}}{X_{(i,x)}}$

The global price is linked to internal prices and is defined as follows in equation (7):

(7) $P_{(i,v)x} = \left(1 + t_{(i,v)x}\right) P_{i,x} * = T_{(i,v)x} P_{i,x} *$

Where $P_{i,x}$* is the price received by the exporting country, *x*, on the world market, and $P_{(i,v)x}$ is the domestic price received for the same good in country, *x*. The two prices are linked in equation (7) by the import tariffs for product, *i*, from country, *x*, into country, *v*, and that import tariff is $t_{(i,v)x}$. The power of the tariff on the global market is calculated as T=(1+t) and is seen above as $T_{(i,v)x}$ which can be defined as the proportional price markup in the importing country that was achieved by the tariff $t_{(i,v)x}$ which is the tariff imposed by country *v* on the product *i* from the exporting country *x* (Francois and Hall, 2003).
After the demand and supply for the product on the world and domestic markets has been defined, the percentage change in world price can be determined for the time period

following the full implementation of the recalibrated trade environment. This is done by solving for the new world price that leads to global market equilibrium. When the tariffs change for a product that has been exported by one country, it results in a change in the demand for imports of that product as can be explained by the cross-price elasticity seen in equation (3).

The model back solves to determine the export quantities using equation (6) and import quantities using equation (8) below, which is calculated by differentiating equation (1).

$$(8) \quad \widehat{M}_{i,v,x} = N_{i,v,x}\hat{P}_{i,v,x} + \Sigma_{\neq x} N_{i,v,\neq x}\hat{P}_{i,v,\neq x}$$

The welfare effects of the recalibration of trade tariffs and quantities can be easily understood and measure by the changes in producer surplus, consumer surplus, and tariff revenue for each country and the sum of these effects is the total welfare change. Jammes and Olarreaga (2005) provide an easy analytical solution to the GSIM model using matrix notation that allows for simpler linear approximation of these effects.

$$(9) \quad \Delta PS = P^*_{v,x} X_{v,x} \hat{P}_{v,x} \left(1 + e_{v,x} \frac{\hat{P}^*_{v,x}}{2}\right)$$

where the proportional change represented by the hat, shows the percentage change in global market price of product *i* exported by country *x*.

$$(10) \quad \Delta CS = \Sigma_x M_{i,v,x} P^*_{i,v,x} T_{i,v,x} \left(\frac{1}{2} N_{i,v} [\hat{P}_{i,v}]^2 sign\left(\hat{P}_{i,v}\right) - \hat{P}_{i,v}\right)$$

The $\hat{P}_{i,v}$ within consumer surplus stands for $\hat{P}_{i,v} = \Sigma_x \theta_{i,v,x} \hat{P}^*_{v,x} + \hat{T}_{v,x}$.

$$(11) \quad \Delta TR_{i,v,x} = t_{i,v,x} M_{i,v,x} P^*_{i,v,x} \left(\left(\hat{t}_{i,v,x}\right) + \hat{P}^*_{i,v,x}\left(1 + N_{i,v,x}\right)\right)$$

The percentage change of the tariff that is imposed by the importing country p on the product i, that is exported by country x is represented by $\hat{t}_{i,v,x}$.

These equations are used in the model to estimate the effects of the Trans Pacific Partnership agreement on global beef trade. The results robustness can be tested using a sensitivity analysis to determine the importance of the data used. There are also multiple scenarios that could arise before and after the agreement continues to move toward completion. These are explored through a variety of scenario analyses.

5.2 Data

The data requirements for the GSIM model include a bilateral trade matrix including the trade value for both origin and destination, a bilateral tariff matrix, and elasticities of import demand, export supply, and substitution. The model used in this study included 14 trade regions. The twelve member countries of the TPP were included, however, Canada was divided into two regions in order to capture the varied trade import/export environment that exists. Another region was included that represented Non-TPP member countries and consists of Brazil, Argentina, and Uruguay, as these are the major beef exporters that were not a part of the TPP. Data for the Non-TPP region used averaged data between the three countries included in it. The regions included in the GSIM model are included in the following Table 2.

Table 2. Countries and Regions Included in the GSIM model

Countries
WESTCAN
EASTCAN
USA
MEXICO
AUS
NZ
JAPAN
CHILE
MALAYSIA
PERU
SINGAPORE
VIETNAM
BRUNEI
NON-TPP

Bilateral trade flow and tariff data for the model was sourced from the UNCTAD's TRAINS[6] database and utilized the trade value data and maximum rate indicator for tariffs. These values were taken for the base year, 2012, using the six-digit HS level code of 020130 (meat of bovine animals, fresh or chilled-boneless). For the purpose of determining the U.S. HS code for the United States which required more specification within the 020130 HS code for the purpose of determining final bilateral tariff data, this study refers to the eight-digit HS code of 0201.30.80 within the TPP text. It is assumed that this is the tariff line that the United States reported TRAINS data for, with the initial tariff level of 26.4%. The base year of 2012 is assumed to be an accurate representation of modern global beef trade as most of

[6] TRAINS is the Trade Analysis Information System from the United Nations Conference on Trade and Development. It is a collection of publicly available information containing trade values and tariff data, and non-tariff measures for 193 reporting countries and 7630 HS lines.

the major beef importing/exporting countries had recovered from any large negative impact arising from disease outbreaks.[7]

Import demand elasticities were sourced from Kee, Nicita and Olarreaga (2004) with the exception of Brunei, which was unavailable. The import demand elasticity for Brunei came from Tokarick (2010). Kee, Nicita and Olarreaga (2004) estimated demand elasticities at the disaggregated six-digit HS code, widely used since the mid-1990's, for 117 countries. These can be seen in the following Table 3.

Table 3. Aggregate Import Demand Elasticities

Country	**Import Demand**
Canada	-2.29
U.S.	-3.39
Australia	-2.49
New Zealand	-1.56
Mexico	-2.08
Japan	-4.05
Brunei	-1.08
Malaysia MYS	-1.45
Vietnam	-1.85
Singapore SGP	-1.30
Peru	-1.74
Chile	-1.61
Non-TPP	-2.43
Brazil (Non-TPP) *	-3.38
Uruguay (Non-TPP) *	-1.40
Argentina (Non-TPP) *	-2.52

From: Kee, Nicita, and Olarreaga (2004)
With exception of Brunei which is from Tokarick (2010)
*average taken

[7] Important recent disease related shocks to the beef industry include a case of BSE in Canada in 2003 and more recent outbreaks of FMD in Uruguay, Argentina and Brazil.

Export supply elasticities were sourced from Tokarick (2010) who provides a non-econometric analysis of export supply and import demand elasticities using an approach similar to that used by Kee, Nicita and Olarreaga (2004) and compares the results to the ones provided by that study. The model used in Tokarick (2010) is a general equilibrium model that is sourced from secondary international trade theory literature. The study uses data from GTAP (Global Trade Analysis Project) between 2001-2004 and incudes short-run and long-run estimates, as well as elasticities adjusted to include general equilibrium effects. This study uses the export supply elasticities for the average of 2001-2004 and in the long-run, not adjusted for general equilibrium effects. These elasticities can be seen in the following Table 4.

Table 4. Aggregate Export Supply Elasticities

Country	**Export Supply Elasticities**
Canada	1.89
U.S.	2.14
Australia	0.80
New Zealand	1.38
Mexico	1.20
Japan	2.22
Chile	0.67
Malaysia	1.55
Brunei	0.34
Peru	0.85
Singapore	3.84
Vietnam	1.35
Non-TPP	1.09
Brazil (Non-TPP) *	1.14
Argentina (Non-TPP) *	0.80
Uruguay (Non-TPP) *	1.33

From: Tokarick (2010)
*average taken

Previous examples of the model used the format laid out in Francois and Hall (2003) which determines the export supply elasticity values based on the size of the country and ranges from 0.5 to 1.5. Tokarick (2010) provides more specific estimated values for export supply elasticities, which was more useful and accurate for this research.

Following Francois and Hall (2003) the elasticities of substitution used in this study are assumed to be equal and constant for all regions. The value for the elasticity of substitution used in this study is 5. If the elasticity of substitution is less than one, then the two goods are complementary, if it is greater than one, then they are substitutes. If the elasticity of substitution is set equal to one, then the products are considered perfect substitutes and any price change will not affect the consumption of either good independently. As the value for the elasticity of substitution increases beyond one, the more responsive consumers will be to price changes between the products. Francois and Hall (2003) use the value of 5 for the elasticity of substitution, as in common in the literature. Utilizing the six-digit HS code further disaggregates the product but increases the specificity, yielding the likelihood of a higher degree of substitution. It is important to note however, that as a good is disaggregated, the choice of varieties becomes fewer and eventually reaches a point where the estimated for elasticities are no longer precise (Broda et al., 2008). Francois and Hall (2003)'s GSIM model assumes imperfect substitutes or national product differentiation. Beef in different national markets can be considered imperfect substitutes (Kerr et al., 1994; Hobbs and Kerr, 1994).

When elasticity of substitution is equal to one (unity), it is a limiting case because this assumes that each product has the same share in world income, which is not a true reflection of the market, but creates demand and prices that do not vary. This is not the case for this model. Thus, the value often used for elasticity of substitution is equal to 5(Fujita, Krugman and Venables, 2000). Log-linear regressions have been used to attempt to measure elasticity of substitution in order to determine the percentage changes in relative quantity and price (Stern, Francis, and Schumacher, 1976). This requires a single consumer indifference curve, which is accurate when assuming that beef is a perfect substitute, but is not accurate when using the Armington (1969) assumption that beef differs based on origin.

5.3 Sensitivity Analysis

The results of the sensitivity analysis can be found in Appendix B, but did not reveal any significant concerns. Increasing the import demand, export supply elasticities, and elasticity of substitution by 10% had minimal effects and no effect on the direction or sign of the changes. These changes did not change the direction and ranged from less than 1% up to 6% amongst the analyses. Using an elasticity of substitution equal to 1 resulted in a change in some direction of signs and changes of a significant amount, such as changes in a negative direction by 50% for some values. This is an extreme assumption, however, as products are normally modeled as inherently imperfect substitutes under the Armington assumption.

Chapter 6: Research Scenarios and Results

The GSIM model was run using the bilateral trade matrix incorporating the elasticity values discussed above as well as initial and final tariff values which yields trade liberalization effects as the output from the various scenarios. The trade liberalization results that can be attained through running the GSIM model scenarios include changes in trade flows, welfare effects (such as the producer surplus and consumer surplus and tariff revenues. Results are reported in millions of US dollars and in percentages.

6.1 The Scenarios

A number of scenarios were analyzed using the GSIM model to determine the effects of different trade situations on the beef industry arising from potential changes to Canada's participation in trade agreements. The first scenario starts with current trade values and tariff levels and then incorporates the full implementation of the TPP. This first scenario calculates results at the 15-year point following the entry into force of the TPP. In this scenario, it was assumed that no other free trade agreements came into effect during the 15-year time frame, and that no major domestic changes took place in any of the countries.

Table 5. The Scenarios

Scenario	TPP Changes	NAFTA Changes
1	All members ratify	None
2	Only U.S. doesn't ratify	None
3	Non-TPP increase export supply elasticity by 15%	None
4	Only U.S. doesn't ratify	Conditions removed
5	Only Canada doesn't ratify	None
6	No members ratify	Conditions removed

The second scenario examined what the effect would be if the United States did not join the TPP. This scenario is strictly theoretical because the U.S. is a member of the TPP and the TPP cannot be brought into effect unless six of the member countries complete their domestic procedures and that those six combined contain 85% of the total GDP of the 12 members. It could be possible, however, for the remaining TPP countries to move ahead with implementing the TPP without the US.

The third scenario that was examined was one where the non-TPP countries increased their global beef trade. This scenario was undertaken to determine the effect on the expected TPP outcome should major beef exporters that are not TPP members aggressively increase their exports outside of the confines of the TPP. This is seen as a potential spillover effect. For this scenario, the Non-TPP region will experience a 15% increase in

export supply elasticity to reflect their increased responsiveness to the changing trade environment following the TPP.

A fourth scenario is run in which NAFTA commitments are no longer in place for bilateral import tariffs and the U.S. does not complete the process to bring the TPP into force, reflecting some of the campaign statements of incoming president Donald Trump. It is assumed in this scenario that the rest of the TPP member countries do move forward and ratify the TPP and it enters into force with the TPP tariff reductions. The abolition of NAFTA conditions would take away the preferential access currently experienced by Canada and Mexico. For this scenario, the U.S. initial and final bilateral tariffs will be reverted to and include tariffs on Canadian and Mexican beef. Since NAFTA in 1994, there has been no tariff on beef among NAFTA countries, however, in order estimate a scenario where NAFTA is abrogated by the US, new tariffs were derived using the TRAINS database. The U.S. tariff on Canadian beef in 1990 was 8%, and on Mexican beef was 10%. The U.S. will receive the same rate that Canada applies to all the other TPP member countries for initial and final tariffs, and will experience no change on the initial tariffs for all other markets included in the model. This fourth scenario determines the effects of the U.S. staying out of the TPP and leaving NAFTA, whilst the rest of the member countries do enter the TPP.

The fifth scenario examined what the results would be if Canada did not ratify the agreement and did not experience any of the tariff reductions within the TPP, leaving NAFTA conditions in place, while the rest of the TPP members ratified. This reflects the

failure of the Canadian Liberal government to endorse the TPP and instead to study it further.

The sixth scenario examined what the results would be if the NAFTA agreement was abrogated by the new administration in the US and the TPP also did not enter into force. The MFN tariffs for Canada (26.5%), Mexico (20%) and the U.S. (26.4%) were used to determine post-NAFTA tariff rates, which were acquired from the WTO's Tariff Download Facility. The U.S. tariffs on beef imports were set to 8% and 10% for Canada and Mexico respectively. However, if the NAFTA agreement was dissolved, it would perhaps be unlikely for the United States to reset their tariffs at a lower rate than those which they would receive from Canada and Mexico. It is impossible to accurately predict the outcome of a renegotiation or dissolution of NAFTA due to opaqueness in U.S. policy making prior to the new Trump administration making its exact intentions known. The Canada-US Trade Agreement (CUSTA) came into effect in 1988 and evolved into NAFTA in 1994 with the addition of Mexico. Fresh and chilled beef tariffs between Canada and the U.S. were eliminated during CUSTA. If NAFTA were to be dissolved, then the status of CUSTA arrangements is unclear. The Canada-Mexico agreement that forms part of NAFTA might also remain in place. It is possible that the beef tariffs between Canada, Mexico and the U.S. may remain at zero. The meat import laws that existed before CUSTA have been described as "seldom imposed and was more of a minor annoyance," with minor tariffs such as 2 cents per pound and also consisted of quantitative restrictions, which would have evolved into tariff rate quotas in the Uruguay Round (Rude, 2001, pg. 1). After NAFTA, the U.S. still had tariffs on their non-NAFTA trading partners of amounts that range from 4.4 cent/kg,

4%, 10% to 26.4% depending on product type. Prior to CUSTA, Canada had, in 1988, a tariff of 4.41 cents/kg on beef from the United States and Mexico had tariffs on fresh and chilled beef of 20% until NAFTA in 1994. U.S. tariffs on fresh and frozen beef before CUSTA ranged from 4.4 cents/kg, to 4% or 10% ad valorem (Brunke, 2002). It is difficult to estimate a post-NAFTA tariff situation given the wide variety of possibilities, however the chosen estimates reflect a single possibility that take into account a slight retaliatory attitude towards the U.S. abrogating the agreement.

6.2 Results

The results arising from a reduction in tariffs following the full adoption of the TPP agreement by all member countries, Scenario 1, are reflected in the new global trade environment, reported in tabular form in the rest of this chapter. The results for multiple scenarios are reported to cover the variety of trade agreement outcomes possible as laid out in the discussion of the various scenarios described previously. Table 1 provides the trade values that are used to initialize the model and presents trade flows, in $US millions, between the countries for the selected HS tariff line. The results of each scenario are reported by the change in the percentage of trade relative to the values in Table 1, the actual value of that percentage, and in terms of the welfare effects. The results of the full adoption of the TPP agreement are generally expected, Western Canada increases exports to Japan by 94 % and slightly decreases exports to the U.S. as a result of diversion of exports. The U.S. decreases exports to Eastern Canada by 11% and Australia increases exports to Eastern Canada by 59%, however the decrease in imported beef from the U.S. is a much larger amount than what is gained from Australia. This is a result of the U.S.

diverting beef to emerging markets, however as production grows to accommodate new demand, trade to Canada will likely increase.

Results from all six scenarios will now be discussed.

Table 6. Initial Bilateral Trade Values (same for all scenarios)

trade at world prices: $million				BEEF											
			destination												
		WESTCAN	EASTCAN	USA	MEXICO	AUS	NZ	JAPAN	CHILE	MALAYSIA	PERU	SINGAPORE	VIETNAM	BRUNEI	NON-TPP
origin	WESTCAN	0	0	635.47	97.14	0	0.16	17.72	0	0	0	0.05	0.01	0	0
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	0	754.65	0	684.91	0	0.19	541.87	40.76	0	0	9.25	0.30	0	0
	MEXICO	0	0	333.61	0	0	0	10.80	0	0.05	0	0	0	0	0
	AUS	0	8.76	240.51	0.81	0	13.18	881.53	99.42	13.13	0	33.87	3.74	0	0.16
	NZ	0	3.29	11.31	0	7.47	0	62.04	0	0.48	0	12.75	0.77	0	0
	JAPAN	0	0.17	2.98	0	0	0	0	0	0	0	4.68	0	0	0
	CHILE	0	0	0.16	0	0	0	0	0	0	0	0	0	0	0
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NON-TPP	0	0	10.40	0.18	0	0	0	629.96	0	0	0.37	0	0	0

6.3 Scenario 1- Full Implementation of the TPP Results, NAFTA remains in force

Table 7. Scenario 1 Results: Changes in Trade by Percent and Actual Amount

trade quantities: percent changes and amount lost/gained (US $Million)																												
							destination																					
		WESTCAN		EASTCAN		USA		MEXICO		AUS		NZ		JAPAN		CHILE		MALAYSIA		PERU		SINGAPORE		VIETNAM		BRUNEI		NON-TPP		Totals	
origin	Change in:	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	Net %	Net Amour
	WESTCAN	0	0	0	0	-4.28	-27.2	13.23	12.851	0	0	49.86	0.078	94.09	16.67	0	0	0	0	0	0	47.16	0.02	77.45	0.01	0	0	0	0	277.52	2.42
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	USA	0	0	-13.33	-100.59	0	0	-13.34	-91.37	0	0	23.28	0.044	73.17	396.49	8.50	3.46	0	0	0	0	0	0	0	0	0	0	0	0	78.28	208.03
	MEXICO	0	0	0	0	-3.17	-10.58	0	0	0	0	0	0	94.96	10.26	0	0	53.35	0.03	0	0	0	0	0	0	0	0	0	0	145.14	-0.29
	AUS	0	0	59.37	5.20	41.49	99.79	34.74	0.281	0	0	-24.49	-3.227	35.57	313.56	-36.58	-36.37	-22.10	-2.90	0	0	0	0	20.70	0.77	0	0	-36.51	-0.057	72.19	376.28
	NZ	0	0	63.06	2.07	45.18	5.11	0	0	-35.09	-2.622	0	0	39.24	24.35	0	0	-17.44	-0.08	0	0	0	0	0	0	0	0	0	0	94.95	28.82
	JAPAN	0	0	76.19	0.13	58.33	1.74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	134.52	1.87
	CHILE	0	0	0	0	32.66	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32.66	0.05
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	NON-TPP	0	0	0	0	-7.76	-0.807	9.75	0.0171	0	0	0	0	0	0	1.74	10.96	0	0	0	0	0	0	0	0	0	0	0	0	3.73	10.17

Source: GSIM model and own calculations

Table 8. Welfare Results of Scenario 1 in $US million

			welfare ($US million)			other (percent)		
	Producer surplus: A	Consumer surplus:B	Tariff revenue:C	Net welfare effect: E=A+B+C	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
WESTCAN	1.17	0	0	1.17	0	0.003	0.002	0.002
EASTCAN	0	-42.21	-3.24	-45.44	0.05	0	0	0
USA	117.67	29.39	-67.50	79.56	-0.02	0.103	0.055	0.055
MEXICO	-0.23	-39.46	-0.16	-39.84	0.05	-0.001	-0.001	-0.001
AUS	206.30	-1.24	0	205.06	0.14	0.28	0.15	0.15
NZ	15.17	-2.22	0	12.95	0.15	0.27	0.14	0.14
JAPAN	0.94	325.85	-356.21	-29.42	-0.12	0.20	0.11	0.11
CHILE	0.03	-14.66	-7.43	-22.05	0.02	0.33	0.17	0.17
MALAYSIA	0	-2.26	0	-2.26	0.15	0.33	0.17	0.17
PERU	0	0	0	0	0	0.33	0.17	0.17
SINGAPORE	0	-8.56	0	-8.56	0.13	0.33	0.17	0.17
VIETNAM	0	0.90	-1.50	-0.59	-0.13	0.33	0.17	0.17
BRUNEI	0	0	0	0	0	0.33	0.17	0.17
NON-TPP	5.49	-0.03	-0.01	5.45	0.15	0.02	0.01	0.01
			Sum=	156.01				

Source: GSIM model

There are a number of interesting, but not particularly surprising results from Scenario 1, where all member countries of the TPP complete their domestic ratification processes and the agreement as a whole enters into force. Most member countries experienced some change in their trade in beef, the major beef importing/exporting countries experienced the most significant changes, as was to be expected. Table 1 shows the value of beef trade between all included regions and Table 2 shows the change in trade, in both percentage and the value, in $US million, of that percentage change. Table 3 shows the welfare effects for Scenario 1 in $US million. Western Canada's exports of beef to all included regions increased by a net US$ 2.42 million, with the largest increases going to Mexico and Japan with values of US$ 12.85 million and US$ 16.67 million respectively. These gains are offset by a large decrease in beef exported to the U.S. which declined by US$27.198 million. In terms of welfare, Western Canada sees a small surplus for producers and Eastern Canada experiences a larger decline in consumer surplus, creating a negative net welfare effect for Canada of $US 46.61 million. The negative welfare effect for Eastern Canada was not expected, welfare was expected to increase due to the increased competitiveness of the

global beef exporters. The negative consumer surplus for Eastern Canada indicates a higher world price due to a realignment of trade among TPP countries. The model does show an increase in products exported to Eastern Canada from Australia, New Zealand and Japan, however these increases are not enough to account for the loss in exports from the U.S. The decrease in U.S. imports to Eastern Canada amounts to a value of US$ 100.59 million while the combined increase from Australia, New Zealand and Japan only amounts to US$ 7.4 million. The large decrease in U.S. exports to Eastern Canada is due to diversion of the product to more lucrative markets. When that diversion is coupled with the increase in world price, it accounts for the higher consumer price realized in Eastern Canada, seen as a large negative consumer surplus. It is possible that the loss in exports from the U.S. will be realized and compensated by an increase in domestic trade or from other competitive countries, lessening the effects of the large negative consumer surplus. The loss of exclusive preferential access to the U.S. for Canada will create an increase in beef trade with more competitive countries, increasing world and consumer price.

Exports from the U.S. to Eastern Canada and Mexico both decline by approximately 13% which is a loss of $US 100.59 million and $US 91.37 million respectively. This is likely due to a redistribution of trade towards Japan, which experiences a 73% gain at a value of US$396.49 million which is one of the largest increases in trade volume provided in the model results. Australia also experiences a large increase in exports to Japan, at a value of US$313.56 million which is a 35.57% increase.

None of the beef exporting countries experience a decline in exports, which is consistent with theory. Losses are offset by the gains to create a net increase. Singapore notably does not experience a change in trade amounts, aside from a small gain in imports from Canada, which can possibly be explained by the diversion of trade away from Singapore by its traditional suppliers to the more valuable markets that have been opened, possibly due to it not being a strong enough market destination. Singapore also did not experience any change in tariff level, already having no initial tariff, leading to small gains when liberalization took place, and does not compete with other newly liberalized markets. There are a few small gains/losses, less than a million $US, in a few smaller markets such

Malaysia and Vietnam. These small changes in trade to these countries can be explained by the overall increase in trade and competitiveness that members of the TPP will experience. These countries are not known to be large exporter/importers of beef, so their markets are reflective of the size of the gains, which was expected. Malaysia experiences a decline in imports from Australia and New Zealand, which could be explained by a diversion of exports to more valuable markets. Exports from Australia to Chile fall by $US 36.37 million, also likely due to the diversion of trade, even with the elimination of Chile's 6% tariff. This scenario creates an overall welfare increase of $US 156 million between consumer/producer surplus and tariff revenue. The impacts of the TPP tariff reductions on beef are substantial, however it is important to note that this a partial equilibrium analysis that does not include other factors that may occur simultaneously. There are losers and winners but the net impact is positive. The GSIM model is short-run and further long-run adjustments will likely be manifest.

6.4 Scenario 2- TPP without the U.S., NAFTA remains in force- Results

Table 9. Scenario 2 Results: Changes in Trade by Percent and Actual Amount Source

	trade quantities: percent changes and actual value of loss/gain ($US Million)																											
						destination																						
		WESTCAN		EASTCAN		USA		MEXICO		AUS		NZ		JAPAN		CHILE		MALAYSIA		PERU		SINGAPORE		VIETNAM		BRUNEI		NON-TPP			
	Change in:	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	Net %	Net Value
origin	WESTCAN	0	0	0	0	0.71	4.51	-6.01	-5.84	0	0	34.90	0.05	94.72	16.78	0	0	0	0	0	0	29.47	0.01	71.23	0.01	0	0	0	0	225.03	15.53
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	USA	0	0	0.24	1.81	0	0	1.28	8.77	0	0	42.18	0.08	-5.64	-30.56	5.94	2.42	0	0	0	0	0	0	0	0	0	0	0	0	44.00	-17.48
	MEXICO	0	0	0	0	-0.45	-1.50	0	0	0	0	0	0	93.81	10.13	0	0	35.95	0.02	0	0	0	0	0	0	0	0	0	0	129.32	8.65
	AUS	0	0	55.61	4.87	-53.97	-129.8	32.66	0.26	0	0	-19.79	-2.61	51.69	455.7	-24.33	-24.19	-17.57	-2.31	0	0	0	0	29.48	1.10	0	0	-29.22	-0.05	24.55	302.95
	NZ	0	0	55.48	1.82	-54.13	-6.12	0	0	-30.02	-2.24	0	0	51.56	31.99	0	0	-17.73	-0.08	0	0	0	0	0	0	0	0	0	0	5.16	25.36
	JAPAN	0	0	88.49	0.15	-12.38	-0.37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76.11	-0.22
	CHILE	0	0	0	0	1.70	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.70	0.00
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	SINGAPOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
	NON-TPP	0	0	0	0	3.15	0.33	-3.58	-0.01	0	0	0	0	0	0	1.08	6.80	0	0	0	0	0	0	0	0	0	0	0	0	0.65	7.13

Source: GSIM model and own calculations

Table 10. Welfare Results of Scenario 2 in $US million

			welfare ($US million)			other (percent)		
	Producer surplus: A	Consumer surplus:B	Tariff revenue:C	Net welfare effect: E=A+B+C	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
WESTCAN	8.24	0	0	8.24	0	0.021	0.011	0.011
EASTCAN	0	4.61	-3.24	1.37	-0.006	0	0	0
USA	-7.50	-53.02	-32.17	-92.70	0.038	-0.007	-0.004	-0.004
MEXICO	4.58	1.55	-0.16	5.97	-0.002	0.025	0.013	0.013
AUS	163.21	-1.04	0	162.18	0.12	0.23	0.12	0.12
NZ	12.81	-1.73	0	11.08	0.12	0.23	0.12	0.12
JAPAN	0.30	191.95	-237.42	-45.16	-0.08	0.07	0.04	0.04
CHILE	0.001	-9.93	-5.19	-15.12	0.01	0.02	0.01	0.01
MALAYSIA	0	-1.78	0	-1.78	0.12	0.02	0.01	0.01
PERU	0	0	0	0	0	0.02	0.01	0.01
SINGAPORE	0	-6.10	0	-6.10	0.09	0.02	0.01	0.01
VIETNAM	0	0.97	-1.40	-0.43	-0.14	0.02	0.01	0.01
BRUNEI	0	0	0	0	0	0.02	0.01	0.01
NON-TPP	3.86	-0.02	-0.004	3.83	0.12	0.01	0.01	0.01
			Sum=	31.36				

Source: GSIM model

In the case where the U.S. does not join the TPP and therefore experiences no changes in their bilateral tariff levels, the result is a change in their welfare from $US 79.56 million gain in Scenario 1 to a loss of $US 92.7 million for the United States. The U.S. would experience a net loss of change in trade to the value of $US 17.48 million if they do not join the agreement, with a decrease of $US 30.56 million in exports to Japan. This can be explained by the foregone opportunity created, as other competitive countries gain preferential access to new markets that the U.S. does not garner. They lose that benefit and. in turn. export less to the newly opened markets. In terms of net welfare benefits, Canada still experiences a net positive gain of $US 9.61 million. The U.S., Japan, Chile, Malaysia, Singapore and Vietnam all experience losses in welfare. Australia and New

Zealand still experience positive effects with Australia being the biggest winner with $US 162.18 million, mostly in producer surplus. This large benefit for Australian producers comes from the large gains in exports, which will increase demand for their beef which will increase prices for the producers. Canada's biggest increase in trade is with Japan, with a gain of 94.72% equal to $US 16.78 million and their biggest loss is to Mexico at 6%, a value of $US 5.85 million. Australia experiences a 51.69% increase in exports to Japan at a gain in value of $US 455.66 million while New Zealand gains $US 31.99 million in exports to Japan. Australia's beef exports to the U.S. fall by 53.97% at a value of $US 129.81 million. Exports to the U.S. decline for all member countries except Canada and Non-TPP countries. With Canada seeing an increase in exports to the U.S. by $US 4.51 million. Canada would decrease exports to Mexico by $US 5.84 million. Canada's increase to the U.S. is expected because it would maintain preferential access to the U.S. while the loss to Mexico can be explained by other countries' improved access to Mexico. Canada would expect to see no change in trade to Australia and small increases in exports to New Zealand, Singapore and Vietnam. The U.S. would still have some increases in exports to Canada and Mexico due to the maintenance of bilateral preferential treatment, as well as minor increases to New Zealand and Chile, but it would not make up for the large loss in exports to Japan. The majority of loss sustained in this scenario is the U.S. and Canada actually sees a larger increase when the U.S. stays out. Australia experiences a large loss in trade to the U.S. at $US 129.8 million and a loss of $US 24.19 million in exports to Chile, likely because Australia is Chile's largest source for imports and a large amount of new trade to Japan would divert their exports.

6.5 Scenario 3- Non-TPP Beef Exporters Increase Competitiveness, NAFTA remains in force- Results

Table 11. Scenario 3 Results: Changes in Trade by Percent and Actual Amount

trade quantities: percent changes and actual value of gain/loss																														
		destination																												
		WESTCAN		EASTCAN		USA		MEXICO		AUS		NZ		JAPAN		CHILE		MALAYSIA		PERU		SINGAPORE		VIETNAM		BRUNEI		NON-TPP			
origin	Change in:	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	Net %	Net Value
	WESTCAN	0	0	0	0	-4.28	-27.20	13.23	12.85	0	0	49.86	0.08	94.09	16.67	0	0	0	0	0	0	47.16	0.02	77.45	0.01	0	0	0	0	183.43	2.43
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	0	0	-13.33	-100.59	0	0	-13.34	-91.37	0	0	23.28	0.04	73.17	396.49	8.50	3.46	0	0	0	0	0	0	0	0	0	0	0	0	5.11	208.04
	MEXICO	0	0	0		-3.17	-10.58	0	0	0	0	0	0	94.96	10.26	0	0	53.35	0.03	0	0	0	0	0	0	0	0	0	0	50.18	-0.29
	AUS	0	0	59.37	5.20	41.49	99.79	34.74	0.28	0	0	-24.49	-3.23	35.57	313.56	-36.58	-36.37	-22.10	-2.90	0	0	0	0	20.70	0.77	0	0	-36.51	-0.057	36.61	377.06
	NZ	0	0	63.06	2.07	45.18	5.11	0	0	-35.09	-2.62	0	0	39.24	24.35	0	0	-17.44	-0.08	0	0	0	0	0	0	0	0	0	0	55.71	28.82
	JAPAN	0	0	76.19	0.13	58.33	1.74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	134.52	1.87
	CHILE	0	0	0	0	32.66	0.05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32.66	0.05
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NON-TPP	0	0	0	0	-7.76	-0.81	9.75	0.02	0	0	0	0	0	0	1.74	10.96	0	0	0	0	0	0	0	0	0	0	0	0	3.73	10.17

Source: GSIM model and own calculations

Table 12. Welfare Results of Scenario 3 in $US million

			welfare ($US million)			other (percent)		
	Producer surplus: A	Consumer surplus:B	Tariff revenue:C	Net welfare effect: E=A+B+C	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
WESTCAN	1.17	0	0	1.17	0	0.003	0.002	0.002
EASTCAN	0	-42.21	-3.24	-45.44	0.05	0	0	0
USA	117.67	29.39	-67.50	79.56	-0.02	0.103	0.055	0.055
MEXICO	-0.23	-39.46	-0.16	-39.84	0.05	-0.001	-0.001	-0.001
AUS	206.30	-1.24	0	205.06	0.14	0.28	0.15	0.15
NZ	15.17	-2.22	0	12.95	0.15	0.27	0.14	0.14
JAPAN	0.94	325.85	-356.21	-29.42	-0.12	0.20	0.11	0.11
CHILE	0.03	-14.66	-7.43	-22.05	0.02	0.33	0.17	0.17
MALAYSIA	0	-2.26	0	-2.26	0.15	0.33	0.17	0.17
PERU	0	0	0	0	0	0.33	0.17	0.17
SINGAPORE	0	-8.56	0	-8.56	0.13	0.33	0.17	0.17
VIETNAM	0	0.90	-1.50	-0.59	-0.13	0.33	0.17	0.17
BRUNEI	0	0	0	0	0	0.33	0.17	0.17
NON-TPP	5.49	-0.03	-0.01	5.46	0.15	0.02	0.01	0.01
			Sum=	156.02				

Source: GSIM model

The results of Scenario 3 where the Non-TPP countries become more responsive as a result of a potential spillover from the increased global competitive trade environment are minimal and do not have any significant differences from Scenario 1. The explanation of results is discussed above in the Scenario 1 results. The changes that do occur, albeit slight, are as follows. The net increase in trade value for Non-TPP countries is the same as Scenario 1 at a value of $US 10.17 million. The total net change in welfare for Scenario 1 and 3 are very similar, at $US 156.01 million and $US 156.02 million respectively, so it increases by a small amount, within the Non-TPP net welfare effect. Therefore, the positive

spillover effects that result from an increase in responsiveness within the Non-TPP countries is very small and affects only the Non-TPP countries.

6.6 Scenario 4- U.S. Leaves TPP and NAFTA and keep TPP for rest of members -Results

Table 13. Scenario 4 Results: Changes in Trade by Percent and Actual Amount

trade values and quantities																												
trade quantities: percent changes and actual values ($US million)																												
					destination																							
	WESTCAN		EASTCAN		USA		MEXICO		AUS		NZ		JAPAN		CHILE		MALAYSIA		PERU		SINGAPORE		VIETNAM		BRUNEI		NON-TPP		Totals	
origin Change in:	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value
WESTCAN	0	0	0	0	-14.96	-95.07	39.36	38.23	0	0	52.61	0.08	106.80	18.92	0	0	0	0	0	0	43.65	0.02	83.76	0.01	0	0	0	0	151.80	-37.88
EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USA	0	0	-39.49	-298.03	0	0	-26.88	-184.10	0	0	78.52	0.15	29.06	157.48	41.04	16.73	0	0	0	0	0	0	0	0	0	0	0	0	-25.33	-307.93
MEXICO	0	0	0	0	-13.06	-43.57	0	0	0	0	0	0	115.12	12.43	0	0	65.81	0.03	0	0	0	0	0	0	0	0	0	0	52.74	-31.10
AUS	0	0	101.23	8.87	-48.67	-117.06	59.93	0.48	0	0	-20.04	-2.64	49.63	437.49	-25.85	-25.70	-17.41	-2.29	0	0	0	0	28.30	1.06	0	0	-28.83	-0.04	68.70	302.82
NZ	0	0	100.66	3.31	-49.39	-5.58	0		-29.90	-2.23	0	0	49.07	30.44	0		-18.13	-0.09	0	0	0	0	0	0	0	0	0	0	3.23	25.85
JAPAN	0	0	133.49	0.23	-7.85	-0.23	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	125.64	0
CHILE	0	0	0	0	2.92	0.005	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.92	0.005
MALAYSIA	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERU	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SINGAPORE	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VIETNAM	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRUNEI	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NON-TPP	0	0	0	0	9.22	0.959	24.60	0.04	0	0	0	0	0	0	0.37	2.33	0	0	0	0	0	0	0	0	0	0	0	0	34.20	3.33

Source: GSIM model and own calculations

Table 14. Welfare Results of Scenario 4 in $US million

			welfare ($US million)			other (percent)		
	Producer surplus: A	Consumer surplus:B	Tariff revenue:C	Net welfare effect: E=A+B+C	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
WESTCAN	-19.49	0	0	-19.49	0	-0.05	-0.03	-0.03
EASTCAN	0	-145.87	108.28	-37.59	0.16	0	0	0
USA	-146.06	-96.03	41.60	-200.49	0.07	-0.15	-0.08	-0.08
MEXICO	-15.99	-76.31	92.15	-0.15	0.09	-0.09	-0.05	-0.05
AUS	160.95	-1.03	0	159.92	0.12	0.22	0.12	0.12
NZ	12.76	-1.68	0	11.08	0.11	0.23	0.12	0.12
JAPAN	0.30	273.33	-187.43	86.20	-0.11	0.07	0.04	0.04
CHILE	0	-4.37	-4.98	-9.35	0.01	0.03	0.02	0.02
MALAYSIA	0	-1.75	0	-1.75	0.12	0	0	0
PERU	0	0	0	0	0	0	0	0
SINGAPORE	0	-5.26	0	-5.26	0.08	0	0	0
VIETNAM	0	1.02	-1.410	-0.40	-0.14	0	0	0
BRUNEI	0	0	0	0	0	0	0	0
NON-TPP	1.84	-0.024	-0.004	1.81	0.12	0.005	0.003	0.003
			Sum=	-15.47				

Source: GSIM model

The net welfare effect is negative when the U.S. stays out of the TPP and gets rid of NAFTA while the rest of the TPP members stay with the TPP. Canada, however, would experience a net welfare loss of $US 57.08 million, with the larger side of the loss attributed to Eastern Canada. This is likely due to Canada and Mexico losing their preferential status and being on the same playing field as Australia and New Zealand, although Mexico's welfare loss in this case is much smaller than Canada's. The U.S. experiences the largest loss in welfare, at an amount of $US 200.49 million, even with a gain in tariff revenue of $US 41.6 million. Australia and Japan experience the largest gains in welfare and New Zealand sees a small gain. Chile has a larger loss of $US 9.35 million while Malaysia, Singapore and Vietnam

have slightly smaller losses. Canada experiences a total loss of $US 37.88 million in exports, all from Western Canada, and the U.S. would lose $US 307.93 million in exports, which includes a 39.49% decrease in exports to Eastern Canada amounting to $US 298.03 million. Mexico would see a loss in beef exports to a value of $US 31.1 million, even with a $US 12.43 million gain in exports to Japan, with the large loss being exports to the U.S. Australia and New Zealand would see total gains in trade exports to the values of $US 302.82 million and $US 25.58 million respectively. Australia and New Zealand would see small gains in exports to Eastern Canada and larger losses in exports to the U.S., this is likely due to the diversion of exports to Japan, which is increased by $US 437.49 million for Australia and $US 30.44 million for New Zealand. The U.S. would lose $US 298.03 million in exports to Eastern Canada, $US 184.10 million losses to Mexico, but would see gains of $US 157.48 million to Japan and $US 16.73 million to Chile. Even though the U.S. would not experience the lower tariffs to these countries, the trade environment would be more competitive and the U.S. would experience the positive spillover of the opening of these markets. Australia and Mexico would see loss in exports to the U.S. at values of $US 117.06 million and $US 43.57 million, respectively.

Vietnam and Australia would see a small increase to Vietnam, of $US 1.08 million. Australia and New Zealand would also see a slight decrease in exports to Malaysia, as larger markets have become available. Canada and Australia would experience their largest increases of exports to Japan in this scenario relative to the others, with $US 18.92 million and $US 437.49 million respectively. There is a loss of $US 2.65 million in exports from Australia. This loss can be explained by the diversion of trade to the large Japanese market.

Australia, New Zealand and the Non-TPP countries are the only ones that experience a net increase in exports, as well as a very small gain for Chile. The gain for Non-TPP countries is due to an increase in exports to Chile, and the increases for Australia and New Zealand are not surprising because they are very competitive producers and stand to gain exports as markets open. However, their gains would be larger if the U.S. stayed in the TPP.

6.7 Scenario 5- Canada stays out of TPP, NAFTA remains and all other members join TPP - Results

Table 15. Scenario 5 Results: Changes in Trade by Percent and Actual Amount

trade quantities: percent changes and actual values																														
					destination																									
		WESTCAN		EASTCAN		USA		MEXICO		AUS		NZ		JAPAN		CHILE		MALAYSIA		PERU		SINGAPORE		VIETNAM		BRUNEI		NON-TPP			
	Change in:	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	Net %	Net Value
origin	WESTCAN	0	0	0	0	-4.298	-27.313	13.206	12.828	0	0	49.836	0.078	-12.366	-2.192	0	0	0	0	0	0	47.136	0.023	-40.893	-0.005	0	0	0	0	39.41	-16.580
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	0	0	-12.025	-90.75	0	0	-13.341	-91.374	0	0	23.289	0.044	73.411	397.80	8.497	3.464	0	0	0	0	0	0	0	0	0	0	0	0	93.17	219.182
	MEXICO	0	0	0	0	-3.197	-10.666	0	0	0	0	0	0	95.171	10.281	0	0	53.325	0.027	0	0	0	0	0	0	0	0	0	0	145.30	-0.357
	AUS	0	0	-59.809	-5.242	41.495	99.801	34.732	0.281	0	0	-24.495	-3.228	35.806	315.641	-36.581	-36.37	-22.107	-2.902	0	0	0	0	20.878	0.782	0	0	-36.52	-0.057	-81.33	368.707
	NZ	0	0	-55.143	-1.812	45.186	5.108	0	0	-35.1	-2.623	0	0	39.478	24.493	0		-17.441	-0.083	0	0	0	0	0	0	0	0	0	0	-23.02	25.083
	JAPAN	0	0	-38.541	-0.066	58.321	1.741	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	19.78	1.674
	CHILE	0	0	0	0	32.635	0.051	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	32.64	0.051
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NON-TPP	0	0	0	0	-7.753	-0.807	9.751	0.017	0	0	0	0	0	0	1.739	10.955	0	0	0	0	0	0	0	0	0	0	0	0	-6.01	10.165

Source: GSIM model and own calculations

Table 16. Welfare Results of Scenario 5 in $US million

			welfare ($US million)			other (percent)		
	Producer surplus: A	Consumer surplus:B	Tariff revenue:C	Net welfare effect: E=A+B+C	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
WESTCAN	1.21	0	0	1.21	0	0.003	0.002	0.002
EASTCAN	0	-46.38	-1.69	-48.07	0.06	0	0	0
USA	117.67	29.32	-67.50	79.49	-0.02	0.103	0.055	0.055
MEXICO	-0.20	-39.47	-0.16	-39.83	0.05	-0.001	-0.001	-0.001
AUS	206.32	-1.24	0	205.09	0.14	0.28	0.15	0.15
NZ	15.17	-2.22	0	12.95	0.15	0.27	0.14	0.14
JAPAN	0.94	317.98	-352.97	-34.05	-0.12	0.20	0.11	0.11
CHILE	0.03	-14.66	-7.43	-22.06	0.02	0.33	0.17	0.17
MALAYSIA	0	-2.26	0	-2.26	0.15	0	0	0
PERU	0	0	0	0	0	0	0	0
SINGAPORE	0	-8.56	0	-8.56	0.13	0	0	0
VIETNAM	0	0.90	-1.49	-0.59	-0.13	0	0	0
BRUNEI	0	0	0	0	0	0	0	0
NON-TPP	5.49	-0.03	-0.01	5.45	0.15	0.02	0.01	0.01
			Sum=	148.77				

Source: GSIM model

All included regions would experience a net welfare effect that is slightly lower when Canada stays out of the TPP than when they stay in, down form from $US 156 million to $US 148 million. Eastern Canada experiences a decline in net welfare of $US 48 million, mostly in consumer surplus and Western Canada experiences a small gain in welfare of $US 1.21 million in producer surplus. This is likely due to a positive spillover from the increased trade. However, Western Canada loses a net value of $US 16.58 million due to decreases in their beef exports. The only other country to experience a net decrease in beef exports is Mexico, at a loss of $US 0.36 million. The U.S. and Australia still experience the large increases in exports that are expected from the increased liberalization, with net increase values of $US 219.18 million and $US 368.71 million, respectively. New Zealand

experiences a smaller net value increase of $US 25.08 million and Japan also see a small increase of $US 1.67 million.

Western Canada does experience a small gain in exports to Singapore and a small loss in exports to Vietnam, however both these amount to rather small values. Canada's largest decrease in exports is to the U.S., at a value of $US 27.31 million, and is slightly offset by a gain in exports to Mexico at a value of $US 12.83 million, an increase of 13%. The loss to the U.S. is expected due to the increased access to the U.S. that Australia and New Zealand would gain. The gain in trade to Mexico is reflected in the existing zero-tariff NAFTA terms that exist between Canada and Mexico, therefore Canada retains that benefit and diverts their excess supply to Mexico after losing/missing out on preference to other markets. U.S.' exports to Mexico fall by $US 91.37 million, likely due to diversion of exports to the new markets. Mexico's exports to the U.S. fall by $US 10.67 million due to the loss of exclusive preferential access, and this is offset by an increase in exports to Japan of a value of $10.28 million, both of which are expected results.

Australia and New Zealand both increase their exports to the U.S., as expected, with values of $US 99.8 million and $US 5.11 million respectively. The U.S. experiences a 73.41% increase in exports to Japan to a value of $US 397.8 million, which is similar to the gain in Scenario 1 of $US 396.49 million for the U.S. and $US 16.67 million for Canada. Australia and New Zealand also experience the expected gains to Japan's market, at values of $US 315.64 million and $US 24.49 million. All exports to Eastern Canada decrease from the included regions, with the biggest being a $US 90.75 million decrease from the U.S. This is

due to diversion of exports to the newly opened, larger markets, however it would be expected that this loss would create an increase in production by the U.S. in the long term.

In terms of net welfare effects, the failure of Canada to ratify the TPP would create losses in welfare to Canada, Mexico, Japan, Chile, Malaysia, Singapore, and Vietnam, with regard to beef. The U.S., Australia, New Zealand, and the Non-TPP countries would still experience positive net welfare effects.

6.8 Scenario 6- Elimination of NAFTA and No TPP- Results

Table 17. Scenario 6 Results: Change in trade by percent and actual amount ($US million)

trade quantities: percent changes and actual values																														
						destination																								
		WESTCAN		EASTCAN		USA		MEXICO		AUS		NZ		JAPAN		CHILE		MALAYSIA		PERU		SINGAPORE		VIETNAM		BRUNEI		NON-TPP		Totals	
	Change in:	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value
origin	WESTCAN	0	0	0	0	-7.74	-49.19	-33.24	-32.29	0	0	26.02	0.04	24.55	4.35	0	0	0	0	0	0	22.73	0.01	25.29	0.003	0	0	0	0	57.61	-77.07
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	0	0	-41.04	-309.73	0	0	-23.17	-158.69	0	0	34.42	0.07	32.95	178.55	33.36	13.60	0	0	0	0	0	0	0	0	0	0	0	0	36.52	-276.21
	MEXICO	0	0	0	0	-13.01	-43.40	0	0	0	0	0	0	28.36	3.06	0	0	30.29	0.015	0	0	0	0	0	0	0	0	0	0	45.63	-40.32
	AUS	0	0	47.35	4.15	3.79	9.12	35.04	0.28	0	0	-0.27	-0.04	-1.74	-15.34	-1.32	-1.31	0.19	0.025	0	0	0	0	-1.00	-0.04	0	0	0.43	7E-04	82.48	-3.15
	NZ	0	0	46.74	1.54	3.18	0.36	0		0.13	0.01	0	0	-2.35	-1.46	0	0	-0.42	-0.002	0	0	0	0	0	0	0	0	0	0	47.28	0.45
	JAPAN	0	0	46.85	0.07	3.29	0.10	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50.13	0.17
	CHILE	0	0	0	0	0.80	0.00	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.80	0
	MALAYSIA	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PERU	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SINGAPORE	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VIETNAM	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRUNEI	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NON-TPP	0	0	0	0	4.44	0.46	35.68	0.06	0	0	0	0	0	0	-0.67	-4.22	0	0	0	0	0	0	0	0	0	0	0	0	39.46	-3.70

Source: GSIM model and own calculations

Table 18. Scenario 6 Welfare Results ($US million)

			welfare ($US million)			other (percent)		
	Producer surplus: A	Consumer surplus:B	Tariff revenue:C	Net welfare effect: E=A+B+C	Change in Overall Consumer Prices	Change in Output	Producer Price for Home Good	Market Price for Home Good
WESTCAN	-38.69	0	0	-38.69	0	-0.103	-0.054	-0.054
EASTCAN	0	-157.98	111.05	-46.93	0.17	0	0	0
USA	-133.54	-24.30	74.10	-83.74	0.02	-0.134	-0.071	-0.071
MEXICO	-20.55	-102.75	110.10	-13.20	0.12	-0.117	-0.062	-0.062
AUS	-2.29	0	0	-2.28	0	0	0	0
NZ	-0.05	0.05	0	-0.01	0	0	0	0
JAPAN	-0.01	61.08	44.01	105.08	-0.03	0	0	0
CHILE	0	5.33	0.13	5.46	-0.01	0.01	0	0
MALAYSIA	0	0.03	0	0.03	0.00	0	0	0
PERU	0	0	0	0	0	0	0	0
SINGAPORE	0	0.74	0	0.74	-0.01	0	0	0
VIETNAM	0	0.04	-0.02	0.02	-0.01	0	0	0
BRUNEI	0	0	0	0	0	0	0	0
NON-TPP	-1.96	0	0	-1.96	0	-0.01	0	0
			Sum=	-75.49				

Source: GSIM model

The sixth scenario depicts the results of the model if NAFTA conditions are removed and the TPP agreement does not enter into force with any of the members. This scenario, with no NAFTA or TPP, results in the largest negative net welfare effect of all the scenarios, a loss of $US 75.49 million. Western and Eastern Canada together experience a net welfare loss of $US 85.62 million, with Eastern Canada experiencing a slightly larger loss than Western Canada. The U.S. experiences the largest loss, $US 83.74 million and Mexico sees a $US 13.2 million loss in welfare. Australia and New Zealand also experience small net welfare losses, with Australia losing $US 2.28 million; and this is the only scenario where Australia and New Zealand experience a loss in welfare. Japan experiences the only

substantial increase in welfare, with $US 105.08 million, and Chile's welfare increases by the second highest amount, $US 5.46 million. Japan experiences an increase in welfare due to a positive consumer surplus that can be explained by the large increase in exports from the U.S. which amounts to $US 178.55 million. This is the largest increase in trade that occurs in this scenario, despite no changes in tariffs between the two Japan and the U.S. The Non-TPP countries also experience a small positive spillover gain, followed by smaller gains for Malaysia, Singapore, and Vietnam, although these are very small.

The largest decrease in total exports is from the U.S. with a loss in value of $US 276.21 million. Canada and Mexico also experience a net decrease in exports with losses of $US 77.07 million and $US 40.32 million respectively. Australia's total net exports decrease by $US 3.15 million and New Zealand's increase by a small amount, $US 0.45 million. The exports to Eastern Canada of the U.S. fall by 41% which is a value of $US 309.73 million, exports to Mexico fall by $US 158.69 million, increase to Japan by $US 178.55 million and increase to Chile by $US 13.6 million. Australia's exports to the U.S. rise by $US 9.12 million and increase to Canada by $US 4.15 million. Both Australia and New Zealand's exports to Japan fall by $US 15.34 million and $US 1.46 million, respectively. Canada also experiences very small increase in exports to Singapore and Vietnam.

6.9 Conclusion

The TPP agreement provides an overall increase in beef trade amongst the included regions. The net benefit is considerably less when the U.S. does not join the agreement. If Canada stays out, the benefit is less but not as substantial as when the U.S. abstains. If the

U.S. were to abrogate NAFTA, they would experience significant losses in welfare and in trade quantities. Australia is the biggest winner following all tariff reduction scenarios and the majority of gains in trade are those to be made with exports to Japan. The results of the reduction in beef tariffs vary greatly amongst the countries and regions based on their import/export importance. There are winners and losers following full implementation of the tariff reductions and the implementation period assumed for the timeline of this thesis allows for sufficient entry/exit to account for changes in demand and supply, which would negate some of the larger effects. Whilst some countries do experience losses, it can be hoped that these could be made up for within another industry within the TPP agreement. As the GSIM model uses short run elasticities, further adjustments to trade may arise over the long run. Table 19 below provides a comparable snapshot of the major results from each scenario.

Table 19. Highlight of Most Interesting Results for Each Scenario

Scenario	Selected Results
Scenario 1 *All TPP enter*	WCAN exports to Japan increase 94% (16.6 million). Large increase in exports to Japan from US (396 million) and AUS (313 million). Negative consumer surplus for ECAN. $US 191 million losses in exports from US to CAN & MEX.
Scenario 2 *Full TPP minus US*	WCAN exports to Japan increase by 94% and decrease to Mexico by 6% ($US 5.85 million). Australia's exports to Japan increase by 51% ($US 455 million) and their exports to US fall by 54% ($US 130 million).
Scenario 3 *Non-TPP have 15% increase in export supply elasticity*	Insignificant effects for all regions, with small changes for Non-TPP region, such as an increase in the Non-TPP net welfare from $US 5.45 to 5.46 million.
Scenario 4 *Full TPP minus US and no NAFTA conditions*	Large negative consumer surplus for ECAN ($US 145 million), negative producer surplus for WCAN ($US 19 million). Negative welfare effect for US of $US 200 million. US would have 39% ($US 298 million) decrease in exports to ECAN but have an increase of $US 157 million in exports to Japan. Australia would lose $US 117 million in exports to US but gain $US 437 million in exports to Japan. Canada's exports to US decrease by $US 95 million and increase to Japan by 106% (4US 19 million).
Scenario 5 *Full TPP minus Canada*	Canada's exports to the US decrease by $US 27 million and increase to Mexico by $US 12.8 million. Exports to Mexico from the U.S. fall by $US 91 million. Exports to ECAN from the US fall $US 90 million. AUS and US maintain large gains in trade to Japan, similar to Scenario 1.
Scenario 6 *No TPP and no NAFTA conditions*	US exports to ECAN decrease by 41% ($US 309 million), decrease by $US 158 million to Mexico and increase by $US 178 million to Japan. Australia's export to the US rise by 9 million and decrease by 15 million to Japan. WCAN's exports to US decrease by $US 49 million and by $US 32 million to Mexico.

Chapter 7: Discussion

7.1 Summary of Results

Global beef trade can be complex as countries have varying rules and guidelines with regard to grading quality, tariff levels, and phytosanitary restrictions and procedures. Trade in beef is also increasing as incomes around the world rise, which increases the consumption of beef worldwide. Most countries engage in beef production to some degree and trade in beef products, with a number of countries being large producers and some are competitive exporters of beef in the global market. Canada, however, is not one of the largest exporters of beef globally, however Canada's domestic producers are reliant on the export industry. Canada's beef industry is also currently very dependent upon and integrated with the United States industry. There are a number of potential situations and influences that could cause changes to the international trade landscape. These possible influences include, but are not limited to, new trade agreements, changes in governments, and abrogated international agreements. Variations of these potential outcomes are reflected in the scenarios included in this thesis, and in particular the Trans Pacific Partnership agreement (TPP) and the North American Free Trade Agreement (NAFTA).

The Trans Pacific Partnership (TPP) is one of a number of ambitious, preferential trade agreements currently being pursued across the globe. Negotiations and implementation become increasingly complex as more members join, and as more topics are introduced into the agreement. Often these agreements are accompanied by criticism and anti-

globalisation rhetoric which can create obstacles to ratification. A balance of trade offs within negotiations is created that becomes undone when governments change and influential members may wish to revisit what has been agreed. Domestic ratification processes may be delayed or not pursued. This thesis was originally motivated by the potential to reduce tariffs on beef under the auspices of the TPP. What was agreed among the twelve members of the TPP has become well-known for its modern conditions surrounding intellectual property and country of origin rules. Beef is not a contentious hindrance to the agreements' implementation, however, the lowering of tariffs explained in this thesis depends upon the agreement's ratification. The eventual results from the lowering/elimination of beef tariffs among the member countries is significant for many of the TPP members and will create a more competitive global marketplace for beef. Due to the multi-country nature of the TPP and the questions surrounding its full implementation, this thesis examines various scenarios in which certain countries fail to ratify the TPP. It also examines potential changes to the existing NAFTA agreement in light of the pronouncements of the new US President during the 2016 US election.

Beef is a commonly and widely enjoyed meat worldwide and its consumption is increasing in many Asia-Pacific countries as their incomes rise. Beef production is intensive and very competitive, and quality is a highly sought after attribute in terms of price and competition. Large beef exporting countries would benefit from the full implementation of this agreement due to the improved market access created by trade liberalisation. The lowering and recalibrating of the various global tariffs and trade flows has a net positive effect and yields an increase in trade, which is expected following the liberalisation. Some

countries experience less substantial gains, and there are minor losses but these are generally appeared to be small and potentially made up for in another chapter or aspect of the agreement. The trade benefits in some markets is redistributed and made up by increases in new markets as product is diverted.

The partial equilibrium, multi-country GSIM model used in this research generated results that provides a variety of insights into the changing dynamics of preferential trade agreements. It provides a confirmation of expected results and some intuition into the trade effect of agreements and what happens if certain members abstain or renege on previously agreed trade arrangements. The various scenarios explored in this thesis accounted for a range of possibilities with regard to ratification or abrogation and show the effect of certain country's failure to ratify and how it would affect the other member countries. The results depict the increased global beef trade between the TPP members and the positive, and expected, results that the tariff reductions would have.

This GSIM model specified 14 regions which consisted of the 12 member countries, with Canada being split into two regions, and a region that represented other major beef producing nations aggregated into a single non-TPP region. The model provided results that described changes in trade flow quantities, tariff revenues, and economic welfare. Welfare results vary significantly among the scenarios and there are some surprising benefits for certain countries when others fail to ratify, and an overall decrease in welfare when the large beef producing countries fail to ratify. The gains and losses in value of trade are non-trivial and varies greatly among the scenarios, thus highlighting the importance of

ratification and non-abrogation. A general comparison of the results of the high impact countries can be seen in Table 20 below.

Table 20. General Comparison of Scenario Results

		Net Export Change-$US million					Net Welfare Change-$US million		
Scenario	WestCan	Mexico	USA	AUS	WestCan	EastCan	Mexico	USA	AUS
1	2.42	-0.29	208.03	376.28	1.17	-45.44	-39.84	79.56	205.06
2	15.53	8.65	-17.48	302.95	8.24	1.37	5.97	-92.7	162.18
3	2.43	-0.29	208.04	377.06	1.17	-45.44	-39.84	79.56	205.06
4	-37.88	-31.1	-307.93	302.82	-19.49	-37.59	-0.15	-200.49	159.92
5	-16.58	-0.35	219.18	368.7	1.21	-48.07	-39.83	79.49	205.09
6	-77.07	-40.32	-276.21	-3.15	-38.69	-46.93	-13.2	-83.74	-2.28

7.2 Implications

The results of this research provide insights on what might be expected with different trade policy outcomes within a specific time frame and assuming similar inputs and unchanging conditions beyond the changes specified in the scenarios selected. The model uses the same basic inputs with regard to base year and initial trade amounts and these are altered to reflect the impacts on the model's inputs depending on a country's trade policy choices. The results show a general increase in trade and welfare when all the members remain invested in and ratify the TPP agreement. There are negative effects, or smaller increases in benefits when a large beef producer, in this case the U.S., stays out of the agreement. It creates a loss in opportunity or forgone benefits for the US and the rest of the members, not to mention the waste of several years of negotiation efforts. Other large producing countries fare better than medium or small beef producing countries. If the U.S., or likely any large producer, does not ratify the agreement, and there were conditions within the agreement that opened new market access for them, they will see large forgone

benefits. If Canada does not enter the TPP, most of the other countries' benefits do not change significantly, and it is Canada that will experience the loss in opportunities. As a smaller beef producing country, the impact made by Canada's theoretical abstention from the TPP, as expected, does not have as great an impact as the U.S. not ratifying. It is not market access to Canada that is as particularly desirable, rather it is the U.S. market that other TPP members covet.

The largest losses in opportunity for all members arise when the TPP does not enter into force for any members, and the U.S. chooses to abrogate NAFTA. The large producing countries, such as Australia, no longer see any of the large gains that were to be made under the TPP and this scenario created the worst results for Canada. The worst result for the U.S. is scenario 4, wherein it leaves the TPP and NAFTA, but the rest of the TPP members find a way to move forward with the same tariff reductions previously negotiated for beef in the TPP (and the Mexico-Canada NAFTA interface). At least on the face of it, eschewing the TPP and abrogating NAFTA is not beneficial for the U.S. This thesis shows the importance of commitment within trade agreements and the wide ripple effect for other members when a member chooses not to ratify or abrogates on existing preferential trade agreements. The possible benefits and the forgone opportunities are very clear and have a large impact when an influential country chooses to decide against trade commitments and agreements.

7.3 Contribution of the Research

This thesis provides a contribution to the current literature by providing multiple insights on the effects of large trade deals for the countries involved. The scenarios studied are a snapshot of single sector of global food trade but is an often discussed industry, as there are many tariffs and non-tariff barriers within the global trade in beef. This thesis used specific export supply elasticities, contrary to similar studies that held them constant based on Francois and Hall, 2003. This allowed for more realistic results, assuming no major changes to export supply elasticities for the countries modeled.

It also provides insights into important current events and examines what happens when a large beef producing country fails to ratify a multilateral trade agreement and what the potential resulting losses for them and for all the member countries. Uncertain political environments can prove disruptive to large complex trade deals and the impact of major changes can be significant. The model provides a look at what happens to one specific sector of a trade deal following a circumstance where an influential trading partner chooses not to ratify or chooses to abrogate an existing agreement. It focuses on a very specific, disaggregated tariff line and examines scenarios through altering the trade constraints in the model to reflect possible changes to trade policy. This thesis also provides a contribution through the further use of the GSIM model by incorporating disaggregate export supply elasticity values, and now it can contribute an understanding of the importance of a country's commitment to a preferential trade agreement. It provides a discussion and comparison of Pacific rim beef trade and the result of fluctuating and

unpredictable political climates and their possible effects on the countries involved. This thesis provides a background for future discussion on the benefits, threats and opportunities with modern trade agreements and the balances within them.

7.4 Limitations of the Analysis

This thesis utilized a model that has inherent limitations based on various assumptions and decisions within it. The use of a partial equilibrium model limits the results on the economy as a whole due to the fact that only one sector is studied. This is made more specific when approaching the Trans Pacific Partnership as whole because beef is one small part of a large deal, and only one tariff line was examined amongst thousands. Thus the results may be missing an influential element that a general equilibrium model would have captured, meaning that these results represent, at best, orders of magnitudes. The use of more specific export supply elasticities does not allow for realizing the possible changes in responsiveness of the member countries following the realignment of the world beef trade. The model uses a static approach that determines what would happen if the tariffs changed instantly in a particular year, where the reality is that these changes will happen over a course of up to 15 years, allowing for more change and influence to occur.

It is also of note that the data for the bilateral trade matrix was taken from a single trade year and it is common within beef trade for prices to fluctuate and for countries to experience unforeseen disease outbreaks that can lead to a halt to trade for a period of

time. A phytosanitary event or disease outbreak could alter the trade environment while the TPP's changes are still being put into effect, thus disrupting the forecasts made by this thesis.

The results are also perhaps understated in the amounts of change in trade values. The base year data was taken before a surge in trade amounts, however due to the nature of the cattle cycle and fluctuating nature of the beef industry as a result of this cycle, the data from the year chosen was kept. If the data was taken from a slightly more recent year, such as 2013 or 2014, then the magnitude of the changes would be larger and more dramatic. It is not likely that higher initial bilateral trade values would have any effect on the direction (sign) of the results.

The GSIM model is also structured to include data on producer and export subsidies, which was not included in this use. Beef subsidies, among TPP members tend be small. There was also no inclusion of domestic consumption included in the bilateral trade matrix. The GSIM model is considered a short-run model, and this thesis assumed full implementation of agreed upon TPP tariff reductions for the longest schedule, which was Japan with 15 years. However, in the long-run there might some additional changes to production and trade policy amongst the members.

7.5 Suggestions for Future Research

There are a number of areas of possibly future research that are related to or can arise from this topic. It may be useful in the future for related studies examining global attitudes

to large preferential trade agreements and whether multiple preferential agreements might be more effective at reaching a negotiated settlement and implemented faster without the hold-ups and losses associated with the time it takes to manage multilateral negotiations. These complex deals can only move as fast as the slowest and most stubborn member, with many more reciprocity requirements having to be taken account of.

The impacts of liberalisation of the beef industry with regard to other countries or trade deals would also be a useful area of research. The obvious possible area for future research is a general equilibrium approach that would reduce some of the limitations associated with a partial equilibrium model. This would be a considerable undertaking but would take into account the changes and other effects of events and industries happening alongside beef. It would be of note to gain a larger and more comprehensive understanding of any current trade agreement through a general equilibrium analysis that also accounts for the subsidization of various industries, which would be possible with enough time and data.

7.6 Conclusion

This thesis examined the impact of an ongoing trade agreement and used a partial equilibrium model to determine the effects on beef trade as a result of trade policy changes arising from the negotiation of abrogation of preferential trade agreements, with particular attention on its effects for Canada. It provides analysis of the current beef import and export environment of the various member countries and provides some insight into the

losses and gains that could be made if full implementation takes place. It also included a consideration and exploration of what the changes are when certain member countries do not enter the agreement or abrogate previous agreements, or do both. This thesis examines a real-life scenario with the inclusion of trade policy changes that provide results for hypothetical, although possible, scenarios during the final stages of agreement ratification. The TPP has evolved over the period when the research was undertaken and these changes and additional intricacies have shaped its direction. Protectionism and globalisation are two non-complimentary forces that are present in the current world trade rhetoric and are proving influential. It is this unpredictable environment that accounted for the comparative nature of this thesis, which serves to enhance the discussion on large trade deals and their feasibility and outcomes in the current landscape. Despite the limitations of the modelling approach used in this thesis, it still shows that the exclusion of large beef trading partners has a negative impact on other members of the agreement and the changing dynamics created by large trade agreements.

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Appendix A

Table 1. Countries and Regions Included in GSIM model

Countries
WESTCAN
EASTCAN
USA
MEXICO
AUS
NZ
JAPAN
CHILE
MALAYSIA
PERU
SINGAPORE
VIETNAM
BRUNEI
NON-TPP

Table 2. Aggregate Import Demand Elasticities

Country	**Import Demand**
Canada	-2.29
U.S.	-3.39
Australia	-2.49
New Zealand	-1.56
Mexico	-2.08
Japan	-4.05
Brunei	-1.08
Malaysia MYS	-1.45
Vietnam	-1.85
Singapore SGP	-1.30
Peru	-1.74
Chile	-1.61
Non-TPP	-2.43
Brazil (Non-TPP) *	-3.38
Uruguay (Non-TPP) *	-1.40
Argentina (Non-TPP) *	-2.52

From: Kee, Nicita, and Olarreaga (2004)
With exception of Brunei which is from Tokarick (2010)
*average taken

Table 3. Aggregate Export Supply Elasticities

Country	**Export Supply Elasticities**
Canada	1.89
U.S.	2.14
Australia	0.80
New Zealand	1.38
Mexico	1.20
Japan	2.22
Chile	0.67
Malaysia	1.55
Brunei	0.34
Peru	0.85
Singapore	3.84
Vietnam	1.35
Non-TPP	1.09
Brazil (Non-TPP) *	1.14
Argentina (Non-TPP) *	0.80
Uruguay (Non-TPP) *	1.33

From: Tokarick (2010)
*average taken

Appendix B

Sensitivity Analysis

A sensitivity analysis was undertaken to determine the validity of the data. Elasticities can have a varying effect on results and should be analyzed to compare what effect altering them had on the data. Lowering and increasing the elasticity of substitution affects consumer response to price. Assuming a low elasticity of substitution, such as equal to 1, implies a more perfect substitute for the beef product. This exercise can inform the degree to which the results of changes arising from the changes imposed on the model can be accepted. Elasticities can have a varying effect on results and should be analyzed to compare what effect altering them had on the degree of change.

For the empirical results of this thesis, the import demand elasticities and the export supply elasticities are increased, in separate trial runs, by 10% to determine what happens when the countries are more responsive to the changes. The elasticity of substitution will undergo a sensitivity analysis by increasing the value by 10% and by running the model using a value of one, to determine the unit elastic results for a scenario assuming perfect substitutes. Lowering and increasing the elasticity of substitution affects consumer response to price. Assuming a low elasticity of substitution, such as equal to 1, implies a perfect substitute among beef products arising in different countries.

The changes are represented in the percent change of trade quantities result table extracted from the GSIM model. All sensitivity analyses will be done on Scenario 1 which provides a sufficient comparison of the results of the analysis for all scenarios.

Table 1. Trade Percentage Changes for Scenario 1-For comparison

		destination													
		WESTCAN	EASTCAN	USA	MEXICO	AUS	NZ	JAPAN	CHILE	MALAYSIA	PERU	SINGAPORE	VIETNAM	BRUNEI	NON-TPP
origin	WESTCAN	0	0	-4.28	13.23	0	49.86	94.1	0	0	0	47.16	77.45	0	0
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	0	-13.33	0	-13.34	0	23.28	73.17	8.50	0	0	0	0	0	0
	MEXICO	0	0	-3.17	0	0	0	94.96	0	53.35	0	0	0	0	0
	AUS	0	59.37	41.49	34.74	0	-24.49	35.57	-36.58	-22.10	0	0	20.70	0	-36.51
	NZ	0	63.06	45.18	0	-35.09	0	39.24	0	-17.44	0	0	0	0	0
	JAPAN	0	76.19	58.33	0	0	0	0	0	0	0	0	0	0	0
	CHILE	0	0	32.66	0	0	0	0	0	0	0	0	0	0	0
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NON-TPP	0	0	-7.76	9.75	0	0	0	1.74	0	0	0	0	0	0

Table 1.2. Import Demand Elasticities (Em) increased by 10% (Eg. 2.29 to 2.519)

	trade quantities: percent changes													
		destination												
		WESTCAN	EASTCAN	USA	MEXICO	AUS	NZ	JAPAN	CHILE	MALAYSIA	PERU	SINGAPORE	VIETNAM	BRUNEI	NON-TPP
origin	WESTCAN	0	0	-3.54	12.23	0	47.56	99.12	0	0	0	45.48	79.82	0	0
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	0	-14.52	0	-14.34	0	20.99	78.20	8.21	0	0	0	0	0	0
	MEXICO	0	0	-2.43	0	0	0	99.99	0	51.19	0	0	0	0	0
	AUS	0	58.19	42.23	33.74	0	-26.79	40.60	-36.86	-24.27	0	0	23.06	0	-40.16
	NZ	0	61.87	45.92	0	-38.60	0	44.27	0	-19.61	0	0	0	0	0
	JAPAN	0	75.01	59.06	0	0	0	0	0	0	0	0	0	0	0
	CHILE	0	0	33.40	0	0	0	0	0	0	0	0	0	0	0
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NON-TPP	0	0	-7.02	8.75	0	0	0	1.45	0	0	0	0	0	0

Table 1.3. Export Supply Elasticities (Ex) increased by 10% (1.89 to 2.079)

	trade quantities: percent changes													
		destination												
		WESTCAN	EASTCAN	USA	MEXICO	AUS	NZ	JAPAN	CHILE	MALAYSIA	PERU	SINGAPORE	VIETNAM	BRUNEI	NON-TPP
origin	WESTCAN	0	0	-4.30	12.81	0	48.27	93.92	0	0	0	45.59	76.38	0	0
	EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	USA	0	-12.81	0	-12.79	0	22.68	73.78	9.07	0	0	0	0	0	0
	MEXICO	0	0	-3.26	0	0	0	94.74	0	51.61	0	0	0	0	0
	AUS	0	60.80	43.36	36.31	0	-23.64	37.33	-34.63	-21.34	0	0	21.48	0	-35.24
	NZ	0	64.47	47.03	0	-33.80	0	40.98	0	-16.70	0	0	0	0	0
	JAPAN	0	77.43	60.00	0	0	0	0	0	0	0	0	0	0	0
	CHILE	0	0	34.70	0	0	0	0	0	0	0	0	0	0	0
	MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NON-TPP	0	0	-7.49	9.62	0	0	0	1.70	0	0	0	0	0	0

Table 1.4. Elasticity of Substitution increased by 10% to 5.5

trade quantities: percent changes														
				destination										
	WESTCAN	EASTCAN	USA	MEXICO	AUS	NZ	JAPAN	CHILE	MALAYSIA	PERU	SINGAPORE	VIETNAM	BRUNEI	NON-TPP
WESTCAN	0	0	-5.13	16.32	0	57.27	98.84	0	0	0	54.01	83.02	0	0
EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USA	0	-13.71	0	-13.96	0	27.00	75.02	9.41	0	0	0	0	0	0
MEXICO	0	0	-3.65	0	0	0	100.01	0	61.23	0	0	0	0	0
AUS	0	67.23	45.14	39.92	0	-24.48	34.51	-39.15	-21.99	0	0	20.62	0	-36.27
NZ	0	70.93	48.84	0	-35.04	0	38.19	0	-17.31	0	0	0	0	0
JAPAN	0	83.60	61.52	0	0	0	0	0	0	0	0	0	0	0
CHILE	0	0	33.33	0	0	0	0	0	0	0	0	0	0	0
MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NON-TPP	0	0	-10.00	11.45	0	0	0	1.951	0	0	0	0	0	0

origin

Table 1.5 Elasticity of Substitution at unit elastic value of 1

trade quantities: percent changes														
				destination										
	WESTCAN	EASTCAN	USA	MEXICO	AUS	NZ	JAPAN	CHILE	MALAYSIA	PERU	SINGAPORE	VIETNAM	BRUNEI	NON-TPP
WESTCAN	0	0	1.58	-5.28	0	-10.06	57.35	0	0	0	-4.93	33.08	0	0
EASTCAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
USA	0	-9.56	0	-8.54	0	-13.32	54.78	0.96	0	0	0	0	0	0
MEXICO	0	0	1.12	0	0	0	56.99	0	-8.84	0	0	0	0	0
AUS	0	2.74	10.54	-1.23	0	-25.40	45.27	-10.44	-23.73	0	0	21.36	0	-39.87
NZ	0	4.63	12.43	0	-34.9	0	47.15	0	-21.34	0	0	0	0	0
JAPAN	0	13.74	21.55	0	0	0	0	0	0	0	0	0	0	0
CHILE	0	0	16.58	0	0	0	0	0	0	0	0	0	0	0
MALAYSIA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERU	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SINGAPORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VIETNAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRUNEI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NON-TPP	0	0	2.84	-4.02	0	0	0	-0.42	0	0	0	0	0	0

origin